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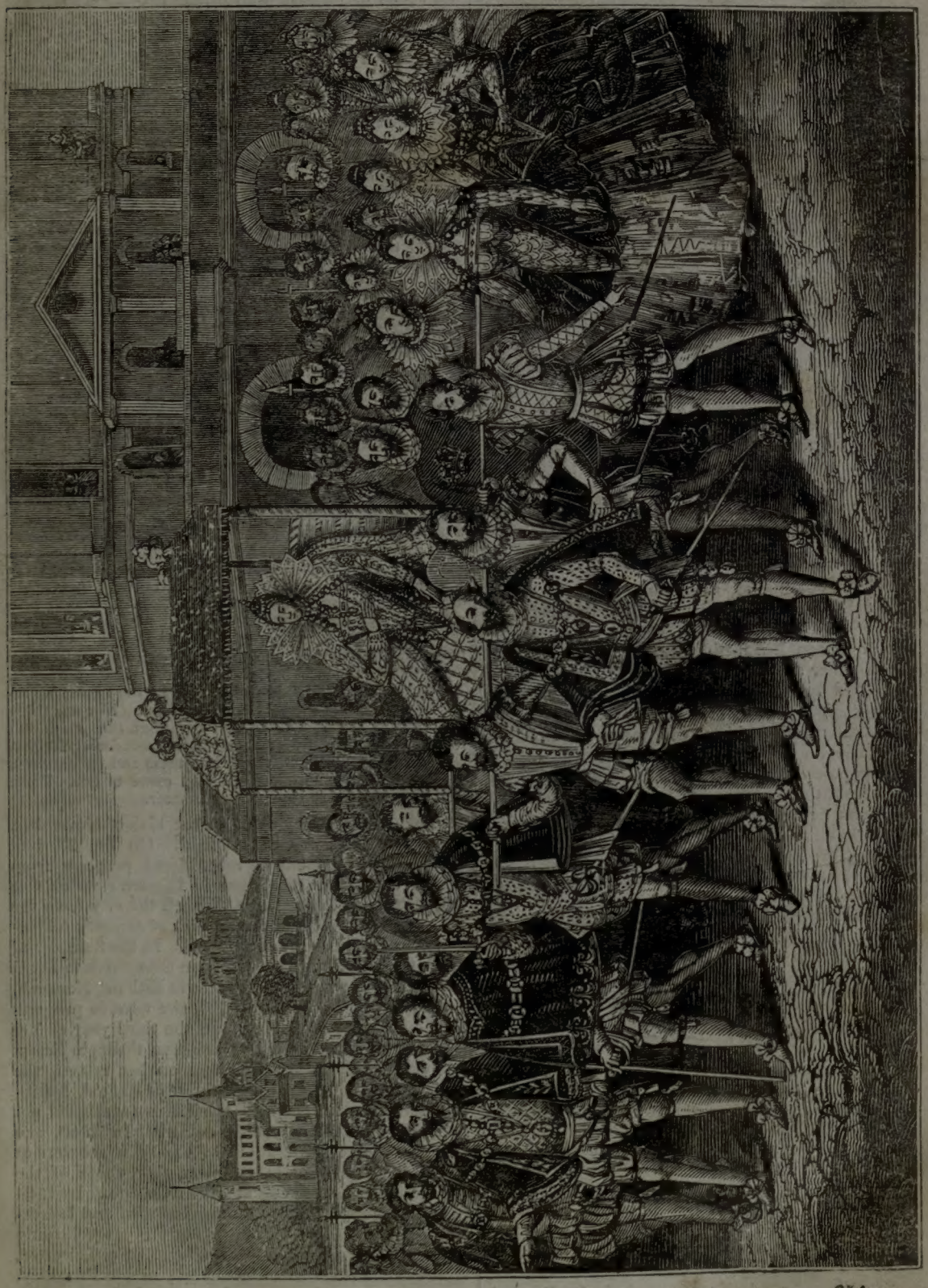


Queen Elizabeth in one of her Progresses, borne by six Gentlemen, and attended by her Court

QUEEN ELIZABETH; HER PROGRESSES AND PUBLIC PROCESSIONS.

No. I.

INTRODUCTION.

IT was remarked in the last century by Bishop Percy, that the splendour and magnificence of Elizabeth's reign are nowhere more strongly painted than in the little diaries which have come down to us of some of her Progresses, or Summer excursions to the houses of her nobility. It may be added with equal truth, that nowhere do we meet with more interesting and instructive illustrations of the manners and taste of that age—an age which, for many reasons, has always been particularly attractive to Englishmen. The same learned and accomplished prelate likewise observed that a more acceptable present could not be given to the world than a republication of a select number of the most interesting accounts,—such as those relating to the entertainments which the Earl of Leicester gave the Queen at Kenilworth Castle in 1575, or to that which the Earl of Hertford gave her Majesty at Elvetham, in 1591. Several years have now elapsed since the desideratum then pointed out in our literature, was more than supplied by the able research and indefatigable industry of Mr. Nichols, who published, in three quarto volumes, all the accounts which he could collect from original contemporary manuscripts, or from scarce pamphlets, &c., concerning the progresses, public processions, and other ceremonials which occurred in the reign of this celebrated queen. Valuable, however, as were the labours of Mr. Nichols, his work is rather a book of reference, or collection of authentic records and documents, than a narrative digested from the materials which he had amassed; its character, therefore, no less than its bulk, renders it not very well fitted to the general reader. Under these circumstances, we deem that we shall be offering an acceptable present, in the phrase of Bishop Percy, to our readers, in furnishing them with a series of papers, descriptive of the progresses of Queen Elizabeth, her public processions, and such other similar matters as tend to illustrate the taste and manners which prevailed in our country during her reign.

The practice of making progresses in different parts of her kingdom, is a striking feature in the plan of popularity which Elizabeth seems to have followed from the beginning of her reign. The spirit of the times encouraged those splendid recreations, when the habits and amusements of the great possessed so different a character from that which they have in more modern times. To show the impression which these progresses made upon the people generally we shall first quote the words of a contemporary poet, who was one of Elizabeth's gentlemen pensioners,—we mean Puttenham, whose *Arte of English Poesie* has secured the transmission of his name to our days. In one of his poems in praise of the Queen, he thus addresses her:—

> Thou that besydes forreyne affayres
> Canst tend to make yerely repayres;
> By Sommer progresse and by sporte,
> To shire and towne, citye and porte,
> To view and compasse all thye lande,
> And take the bills with thine own hande
> Of clowne and earle, of knight and swayne,
> Who list to thee for right complayne,
> And therin dost such justice yeelde,
> As in thy sexe folke see but seelde;
> And thus to do arte less afrayde,
> With houshold trayne, a syllye mayde,
> Than thyne annecestours one of tenne
> Durst do with troopes of armed men.

In the *Character of Queen Elizabeth*, by Edward Bohun, a writer of the seventeenth century, the scheme of her progresses is thus explained:—

In the Summer she for the most part lived in the countrey; and she took her royal progresses into the several counties of England, and she would amuse herself with considering and commending the pleasantness and goodness of her country, and the greatness and variety of the fruits England produced; she would also admire the wisdom and goodness of God in diversifying the face of the earth, by the mixture of fields, meadows, pastures, and woods; and she would, as occasion offered, hunt too. In all this she was intent upon that which was her main business, the government of her people, the management of her family and of her revenues, and the observing the state and condition, the carriage and designs, of the neighbour states and princes. Which way soever she went, she was sure to draw upon her the eyes of her people: innumerable crowds of them met her in all places with loud hearty acclamations, with countenances full of joy, and hearts equally filled with love and admiration: and this ever attended her in publick and in private: for what sight in this world can possibly please mortals like that of a just, beneficent, and kind prince? So that those places were accounted the most happy, in which, for the goodness of the air or the pleasantness of the fields, she was pleased to stay the longest.

He then proceeds to describe her extreme affability and condescension during these journeys, and the effect thereof upon her people:—

In her progress she was the most easy to be approached; private persons and magistrates, men and women, country people and children, came joyfully, and without any fear, to wait upon her and see her. Her ears were then open to the complaints of the afflicted, and of those that had been any way injured. She would not suffer the meanest of her people to be shut out from the places where she resided, but the greatest and the least were then in a manner levelled. She took with her own hand, and read with the greatest goodness, the petitions of the meanest rusticks: and she would frequently assure them that she would take a particular care of their affairs, and she would ever be as good as her word. She, by her royal authority, protected those that were injured and oppressed: she punished the fraudulent, false, perfidious, and wicked. In all this variety of affairs she was able to keep her temper, and appear with an equal and uninterrupted serenity and humanity to all that came nigh her; she was never seen angry with the most unseasonable or uncourtly approach: she was never offended with the most impudent and importunate petitioner. There was no commotion to be seen in her mind; no reproaches, no reprehensions came from her. Nor was there anything in the whole course of her reign that more won the hearts of the people than this her wonderful facility, condescension, and the strange sweetness and pleasantness with which she entertained all that came to her. Thus, for the most part, she spent her Summer.

When Queen Mary died, on the 17th of November, 1558, Elizabeth was at Hatfield. On the 23rd of November, she made a magnificent progress from thence to the Charter-house in London; which was the prelude to her passage through the city from the Tower to Westminster, on the 13th of January following, the day before her coronation. In the Summer of 1559, she made an excursion from Greenwich to Dartford and Cobham, and afterwards to Eltham, Nonsuch, and Hampton Court. In 1560, she went in progress to Winchester and Basing. In the third year of her reign, 1561, she began her progress through Essex, Suffolk, and Hertfordshire; and on her return, she passed from Hertford Castle through Enfield, Islington, and over St. Giles in the Fields (which did not then belie its name,) to St. James. In 1563, she received the congratulations of the Eton scholars at Windsor Castle, and in the next year, those of the University of Cambridge at King's College. In 1564 likewise, she went into Huntingdonshire and Leicestershire; in 1565, to Coventry, and the year following to Oxford, in compliment to Dudley, Earl of Leicester, then Chancellor of that University; and to Burghley, on a visit to her Treasurer, the great Cecil. In 1567,

she was in Berkshire, Surrey, and Hampshire; in 1568, in Kent, Essex, Hertfordshire, and Northamptonshire; in 1569, in Surrey and Hampshire. In 1570, Elizabeth went into the city again, to honour Sir Thomas Gresham on the occasion of his building the Royal Exchange; she was likewise entertained by him in 1573, at his mansion at Mayfield in Sussex; and some time between 1577 and 1579 at his house at Osterley near London. In 1571, she visited Hunsdon House, which had formerly been her nursery, and which she gave to her first cousin, Henry Cary, whom she had created Baron Hunsdon. On May-day, 1572, she was entertained at Greenwich, with many warlike feats, by the citizens of London; the coming of the French ambassadors in the same year, was the occasion of great festivities, and after their departure, the Queen proceeded on a progress into Essex, Kent, Herts, Bedfordshire, to Kenilworth, Warwick, Reading, Windsor, and Hampton Court; at which last place, about the end of September, she fell ill of the small-pox. In 1573, she passed through a part of Surrey and Sussex, and honoured many places in Kent with her presence. She visited Archbishop Parker at Croydon; and seems to have intended paying him another visit in 1574; in which year also, she was amused at Bristol with the regular siege of a fort; was entertained by the Earl of Pembroke at Wilton, and visited the city of New Sarum.

In 1575, the Queen made a progress through the counties of Northampton, Oxford, and Worcester; and it was during this progress, that she was so magnificently entertained for nineteen days by the Earl of Leicester at Kenilworth*. In 1577, she was again in Kent, Surrey, and Sussex, and spent three days at Sir Nicholas Bacon's mansion at Gorhambury. In 1578, she went over Norfolk, Suffolk, and Cambridgeshire; and received the compliments of the University of Cambridge on her way, at Audley Inn. In 1579, she again visited Essex and Suffolk. In 1581, she received ten commissioners from the King of France concerning her marriage with the Duke of Anjou; and in their honour, a "Triumph" was performed with great solemnity.

From 1581 to 1588, the Queen appears to have remained quiet at Westminster; her amusements consisting of shows and tiltings on the reception of foreign princes and ambassadors. In the latter year, which is memorable for the projected invasion of her kingdom by the Spaniards, and the defeat of their grand Armada, Elizabeth paid her celebrated visit to her army at Tilbury Fort. In 1591 we find her recommencing her progresses over Surrey, Sussex, and Hampshire, and being entertained at Cowdry, Southampton, and Elvetham; and the next year at Bisham, Sudley and Ricott, with all the fantastic pomp which characterized the age. In 1592, likewise, she paid a second visit to Oxford, in compliment to Lord Burleigh, who was then Chancellor of that University. In 1594, the students of Gray's Inn entertained her with a masque; and next year the Earl of Essex celebrated the anniversary of her accession with a "device." In 1599, she went again over part of Berkshire. In 1600, she honoured the wedding of Lord Herbert with her presence, in Black Fryers, and was there entertained with dancing and a masque at the Lord Cobham's, and even "dawnced†" herself, though in her sixty-eighth year. In 1600, also, and the following year, she made progresses into Surrey, Hampshire, Wiltshire, and Berks; and in 1602, she made short visits from the capital into Middlesex and Kent. In the year 1603, she closed her reign and life.

The Puritans in Elizabeth's time, condemned much of the gaiety and splendour of the court, but the queen was exhorted from the poetical press, not to regard their objections. The poet and gentleman pensioner, George Puttenham, in a poem, or rather collection of poems, styled *Partheniades*, which he devoted as a new year's gift to the Queen in 1579, has some lines written for the purpose of maintaining "agaynste the Puritantes," that "amonge men many thinges be allowed of necessitye, many for ornament, which cannot be misliked nor well spared, without blemishe to the cyvile life;" and that "all auncyent courtly usages, devised as well for the publique intertaynments, as for other private solaces and disportes," are "not scandalously evill or vicious." The muse Calliope, addressing the Queen, recounts a list of calamities which must result from adopting the obnoxious principles:

> Deny honoure to dignity
> And triumphe to just victorie
> Pull puissance from soverayntie
> And credit from authoritee
> From holy-dayes and fro weddinges
> Minstrells and feasts and robes and ringes
> Take fro kinges courtes intertaynments;
> From ladyes riche habillimentes:

And then indignantly exclaims—

> Princesse! yt ys as if one take away
> Green woodes from forrests and sunne-shine fro the daye.

The chances of success in this contest, were naturally with the poets. The innovating spirit of the Puritans rendered them very unacceptable to the Queen; and the manner in which they put forward their demands, was not at all calculated to ensure their success. Camden thus describes the "Insolency of the Puritans," in the year 1588, in which year, he tells us, that England was "pestered with schism."

> Certainly, (he says,) never did contumacious impudency and contumelious malapertness against ecclesiastical magistrates, show itself more bold and insolent. For when the Queen (who was always the same) would not give ear to innovatours in religion who designed (as she thought) to cut in sunder the very sinews of her ecclesiastical government and her royal prerogative at once, some of those men who were great admirers of the discipline of the church of Geneva, thought there was no better way to be taken for establishing the same in England, than by inveighing and railing against the English hierarchy, and stirring up the people to a dislike and hatred of the bishops and prelacy. These men, therefore, set forth scandalous books against both the church government and the prelates, the titles whereof were, *Martin Marre-Prelate, Mineralis, Diotrephes, a Demonstration of Discipline, &c.* In these libels they belched forth most virulent calumnies and opprobrious taunts and reproaches in such a scurrilous manner, that the authors might seem to have been rather scullions out of the kitchen than pious and godly men. Yet were the authors thereof (forsooth) Penry and Udal, ministers of the word, and Job Throckmorton, a learned man and of a facetious and gybing tongue. Their favourers and upholders were Richard Knightley, and Wigston, Knights, men otherwise good, grave, and sober, but drawn in by certain ministers, who aimed at some private respects of their own, for which the said knights had smarted by a heavy fine laid upon them in the Star-Chamber, had not the Archbishop of Canterbury, (such was his mildness and good nature,) with much adoe requested and obtained a remission thereof from the queen.

But if the Queen had been disposed to abolish what the Puritans disliked, she had not the power to do so. She did not, as Mr. Sharon Turner remarks, like Charles the Second, make the manners of her

* See *Saturday Magazine*, Vol. I., p. 101.

† The fondness of Queen Elizabeth for music and "dawncing" in her old age, is thus noticed in a letter from the Earl of Worcester to the Earl of Shrewsbury, dated September 19, 1602, and printed by Mr. Lodge, from the Talbot MSS., in his *Illustrations of British History*: "Wee are frolyke heare in Courte; mutche dawncing in the privi chamber of contrey dawnces before the Q. M. (Queen's Majesty) whoe is exceedingly pleased therwth. Irishe tunes are at this tyme most pleasing," &c.

court. She found them as they were; poets reprimanded them, but the nobility were too formidable, and her crown too precarious from their cabals, to allow her to alter their state or enjoyments. She had no choice but to join the festivities they expected and required. It was the general taste, as well as his own, and not peculiarly the queen's inclination, that Leicester sought to gratify by his magnificent festivities at Kenilworth.

It has been oftentimes objected to these progresses that they were calculated only to impoverish her wealthy subjects under colour of honouring them,—that, in fact, they were an instrument of oppression in the hands of the Queen. With reference to the poorer classes of the people, it is allowed that she seemed on all occasions willing to spare them; but for those of better rank and fortune, it is said that she had no consideration, but that, on the contrary, she contrived in many ways to pillage and distress them.

It was the tameness of that time, (says a speaker in one of Bishop Hurd's Dialogues,) to submit to every imposition of the sovereign. She had only to command her gentry on any service she thought fit, and they durst not decline it. How many of her wealthiest and best subjects did she impoverish by these means, (though under colour you may be sure of her high favour); and sometimes by her very visits!

An old writer, in a *Description of England*, speaking of the variety of the Queen's houses, checks himself with saying,—

But what shall I need to take upon me to repeat all, and tell what houses the Queen's Majesty hath, sith all is hirs? And when it pleaseth hir in the Summer season to recreate hirself abroad and view the state of the countrie, and hear the complaints of her unjust officers or substitutes, every nobleman's house is hir palace where she continueth during pleasure, and till she returne againe to some of hir owne; in which she remaineth as long as pleaseth hir.

The historian Carte, expressing the opinion that "Queen Elizabeth made it her business to depress the nobility," and that "even her appearing favours ministered to this purpose," adds,—

Whether she stayed a time with any of them in her progress, (as she did A.D. 1601, for a fortnight together, with the Marquis of Winchester at Basing, or only took a dinner,) they paid very dear for the honour of the visit; and whatever exorbitant expence she put them to, she did not think herself well entertained unless they made her a rich present at parting. Thus, dining on December 6th, not four months before her death, at Sir Robert Cecil's, he made her, when she went away, according to the custom, presents to the value of two thousand crowns. Her ministers might, perhaps, be able to support such an expense; but by impoverishing the nobility, who were generally discontented at their usage, it sunk their credit so low that it was impossible for any of them to get a number of followers, were they never so inclined to make a disturbance.

In Sir Henry Ellis's *Original Letters illustrative of English History*, are a few epistles illustrative of the feelings of some of Queen Elizabeth's subjects, when they heard that her Majesty had vouchsafed to honour them with a visit during her Progresses; and the editor remarks, that it will be readily gathered from those letters, how inconvenient to many these Progresses must have been. Sir Nicholas Bacon, the Lord Keeper, in a letter to Lord Burghley, concerning the Queen's contemplated visit to him at Gorhambury, in 1572, rejoiced much that her Majesty intended to do him so great an honour, but owned himself quite a novice in receiving royalty. The Earl of Bedford, writing to Lord Burghley in the same year, announces his intention of preparing for her Majesty's coming to Woburn, "which shall be done," he says, "in the best and most hartiest manner that I can;" but he trusts, at the same time, that the Lord Treasurer "will have in remembraunce to provide and helpe that her Ma^te^ tarieng be not above two nights and a daye," hinting, indeed, that he has made preparation for no longer time.

"Archbishop Parker," says Sir Henry Ellis, "was one of the few who seemed thoroughly pleased at one of these intended visits. A thought struck him to make it subservient to the promotion of the protestant religion." This visit, which we shall describe on a future occasion, was paid to the Archbishop of Canterbury in 1573, and in his letter to the Lord Treasurer, he says,—

It would much rejoyce and stablishe the people here in this religion, to see her Highness that Sondaye (being the first Sonday of the moneth, when others also customablie may receive) as a godlie devoute prince, in her chiefe and metropolituall churche, openly to receive the communyon. which by her favour I would minister unto her. *Plurima sunt magnifica et utilia; sed hoc unum est necessarium.* [Many things are magnificent and useful; but this one is necessary.] I presume not to prescribe this to her Highnes, but as her trustie chapleyn shewe my judgement.

Strype tells us that a rumour of the small-pox and measles being at Canterbury, caused some stop of the Queen, and made the archbishop stay some of his carriages. "For as in fifteen years it should rejoice him, as he told the lord treasurer, to see her Majesty at his house at Canterbury, the cost whereof he weight not; so he would be loth to have her person put in fear or danger."

In the year 1577, Lord Buckhurst, who expected to receive her Majesty at Lewes, was so forestalled in respect of provisions, by other noblemen in Sussex and the adjoining counties, that he was obliged to send for a supply from Flanders. He thus writes to the Earl of Sussex:—

My very good lord,—

I besech your lordship to pardon me yf thus I shall becom troblesome unto you, to know some certenty of the Progres yf it may possibly be. The time of provision is so short, and the desire I have to do all thinges in such sort as appertaineth, so great, as I can not but thus importune your lordship to procure her H. to grow to some resolucion, both of the time when her Ma. will be at Lewis, and how long her H. will tary theare. For having alredy sent in to Kent, Surrey, and Sussex, for provision, I assure your lordship I find alredy all places possest by my lord of Arundell, my lord Mountague, and others. So as of fors I am to send in to Flaunders, which I wold spedely do yf the time of her Ma. coming and tarians with me were certain. I besech your lordship, therefore, yf it may be, let me know by your Lo. favourable means somewhat whereunto to trust, for if her H. shall not presently determin, I se not how possibly we may or can perform that towardes her Ma. which is du and convenient.

When Mr. (afterwards Sir) Michael Hickes, Lord Burghley's secretary, was married, in 1597, the Queen hinted that she would honour him. Hickes wrote to a friend at court to ask the Lord Chamberlain what preparation he should make; and his friend told the Lord Chamberlain that it troubled Hickes, "that he had noe convenient place to entertaine sum of her Ma^ties^ necessary servants." The Lord Chamberlaine's reply is thus communicated to Hickes by his friend:—

His answeare was, that you weare unwise to be at aine such charge: but onelie to leave the howse to the Quene: and wished that theare might be presented to her Ma^tie^ from your wief, sum fine wastcoate, or fine ruffe, or like thinge, which he said would be acceptablie taken as if it weare of great price.

Sir Henry Ellis notices it as a fact not generally known, that much as these visits sometimes put the Queen's subjects to expense, "the cost of them to the public treasury was also a matter of deep concern."

Among the Lansdowne Manuscripts in the British Museum, is "an Estimate of increase of Chardgies

in the time of Progresse, which should not be if her Majestie remeynid at her Standing Howses within xx. myles of London; collected out of the Creditors of the last Progresse, Anno, xvto Reginæ Elizabeth," A.D. 1573. It is altered and corrected in Lord Burghley's hand. The increase of charges caused by the Progress, appears to have amounted in the whole to 1034*l.* 0*s.* 6*d.*

Lord Burghley, it is probable, (says Sir Henry Ellis,) would have been personally glad, if the Progresses could have been altogether dispensed with. The Queen's visits to him were extremely frequent. His Lordship's treatmen of the Queen's suite when she went to Theobalds, seems not to have been generally acceptable to the visiters. In more than one letter we find the writers vexed when they learned they were to go there.

Yet, although the Queen's visits might have put her nobles to considerable expense and inconvenience, the inference is not necessarily to be drawn that those visits were unacceptable, and that the parties to whom they were paid, thought the honour of receiving them an insufficient compensation for the cost and annoyance which they occasioned. Are we sure, as Mr. Nichols asks, that Leicester thought he paid too high a price for the gratification of his ambition,—or that the Earl of Hertford regretted the expense of regaling her Majesty at Elvetham, to regain her long forfeited favour; or that Sir Robert Cecil thought much of the great entertainments he gave her at Theobalds, when she conferred the honour of knighthood on him in 1591, and it was expected that he would have been advanced to the secretaryship. Cecil, indeed, glories how much Theobalds was increased by occasion of her Majesty's often coming; "whom to please," says he, "I never would omit to strain myself to more charges than building it." The strong desire of Elizabeth's subjects to please her in her progresses, was never more strikingly shown than on the occasion of a visit which she paid to Sir Thomas Gresham, the founder of the Royal Exchange, at the mansion which he had built at Osterley, in Middlesex. Her Majesty happened to find fault with the court of the house, observing that it was too great, and that it would appear more handsome if divided with a wall in the middle.

What doth Sir Thomas, but in the night time send for workmen to London, (money commands all things,) who so speedily and silently apply their business, that the next morning discovered the court double, which the night had left single before. It is questionable whether the Queen next day was more contented with the conformity to her fancy, or more pleased with the surprise and sudden performance thereof.

Her courtiers amused themselves with sundry witticisms upon the transformation; some observing that it was no wonder he could so soon *change a building* who had been able to *build a Change*; while others, reflecting on some well known differences in the knight's family, remarked that a house was easier *divided* than *united*.

The visits which Elizabeth paid to Cecil were frequent. She was twelve times at Theobalds, which stood at a very convenient distance from London. Each visit cost Cecil two or three thousand pounds—a large sum in those days; the Queen staying with him "at his lordship's charge," sometimes three weeks or a month, or six weeks together.

Sometimes she had strangers or embassadors come to her thither, where she has been seen in as great royalty and served as bountifully and magnificently as at any other time or place, all at his lordship's expense, with rich shows, pleasant devices, and all manner of sports that could be devised, to the great delight of her Majesty and her whole train, with great thanks from all who partook of it, and as great commendations from all that heard of it abroad. His lordship's extraordinary charge in entertaining of the Queen, was greater to him than to any of her subjects. But his love to his sovereign, and joy to entertain her and her train, was so great, as he thought no trouble, care, or cost, too much, but all too little, so it were bountifully performed to her Majesty's recreation, and the contentment of her train.

It appears, moreover, that although Elizabeth was fond of magnificence and show, and wished to be royally entertained, she, nevertheless, "misliked superfluous expense" in her progresses. Puttenham, in his *Arte of English Poesie*, after laying down a number of rules to regulate the carriage of courtiers to their sovereigns, observing that, in playing with a prince, it is decent to let him sometimes win of purpose, "to keepe him pleasant," and never to refuse his gift, "for that is undutifull; nor to forgive him his losses, for that is arrogant, nor to give him great gifts, for that is either insolence or follie, nor to feast him with excessive charge, for that is both vaine and envious," adds—

And therefore the wise prince, King Henry the Seventh, her Majesty's grandfather, yf his chaunce had been to lye at any of his subjects' houses, or to passe moe meales then one, he that would take upon him to defray the charge of his dyet, or of his officers and houshold, he would be marvelously offended with it, saying—What private subject dare undertake a Prince's charge, or looke into the secret of his expense? Her Majestie hath bene knowne oftentimes to mislike the superfluous expense of her subjects bestowed upon her in times of her progresses.

Much of the manners of the times may be learned from these Progresses.

They give us (says Mr. Nichols) a view into the interior of the noble families, display their state in housekeeping, and other articles, and set before our eyes their magnificent mansions, long since gone to decay, or supplanted by others of the succeeding age. Houses that lodged the Queen of England and her Court, are now scarcely fit for farms, or levelled with the ground or rebuilt. Such were the seat of the Compton family at Mockings; of the Sadleirs at Standon; of the great Burleigh at Theobalds; of the Earl of Leicester at Kenilworth; of the Bishop of Ely at Somersham; Sir Thomas Cook's at Giddyhall; Sir Thomas Mildmay's at Moulsham; Lord Rich's at Leighs; Sir Thomas Waldgrave's at Smallbridge; Mr. Tuke's at Layer Marney. The royal palaces are almost all gone.

Our illustration is copied from a very celebrated engraving by Vertue—one of his "Historic Prints," which he copied, in 1737, from the original picture in the possession of the Earl of Oxford, at Coleshill in Warwickshire. It had then been in the hands of that family for fifty or sixty years; but no account of it had been handed down, except that it was painted in memory of Queen Elizabeth's visit to a young married couple. Who the parties thus honoured were,—and when or where the visit was made,—were points wholly unexplained. Vertue himself, after much consideration, came to the conclusion that it represented a visit to Henry Cary, Lord Hunsdon, at Hunsdon House in Hertfordshire, where she is known to have been in September, 1571; and that it was the work of Mare Gerrards of Bruges, painter to Queen Elizabeth. But the appropriation of the scene to Hunsdon House, has been controverted in the British Topography as having every probability against it.

The queen is seated in a canopy-chair of state, carried by six gentlemen; several knights of the garter with their collars are walking before the queen, and many favourite ladies following in the train. Her yeomen of the guard follow, and the band of gentlemen pensioners line the way.

I have some reasons to think (says Vertue) that amongst the ladies that follow the Queen, the foremost in white may be the Lady Hunsdon; on her right hand, Lord Hunsdon's sister, Lady Katherine, who was wife to Admiral Howard, and next behind, in a dark grave habit, Lady Mary Boleyn, mother of Lord Hunsdon: all the ladies are richly adorned with jewels, &c., to grace the solemnity of this procession.

THE HUMAN HEART.

HAD man been a mere animal machine, destitute of reason, he would have been the most defenceless creature on earth. The elephant possesses an instrument by which he can grasp his enemy, and an enormous weight by which he can trample him to death. The bear is endowed with a degree of muscular strength, by which he can compress the human figure with as much facility as we break a nutshell. The lion and the tiger can spring upon their prey, and fix it by their claws to the earth until they satiate their hunger. But the infant, what a helpless being it is, and remains, long after it first sees the light! The idiot who never enjoyed reason; the melancholy maniac who has been deprived of it: how pitiably weak and dependent are they, compared with the rhinoceros or the eagle! Nevertheless, it has been given to man to subdue all the tribes of animated nature to his use, and he has fulfilled his destiny in that respect by means of his hand, the most perfect physical instrument with which we are acquainted. Not all the skill of man has yet been able to imitate the hand in its formation and functions, or to suggest an improvement in one of its joints or muscles. Galen's enthusiastic and eloquent description of it, which the reader will find translated in Dr. Kidd's volume, though unrivalled in ancient or modern literature, scarcely does justice to the flexibility, delicacy, and strength of this admirable instrument. But it is, after all, nothing more than an instrument; it would have been, comparatively, powerless, had it not been moved to action by the rational faculty of which it is the immediate servant.

Yet, although it is by means of the hand that we operate upon external matter, we cannot perceive, as Sir Charles Bell justly remarks, any relation between that instrument and the mind. The hand is not more distinct from the rose which it is about to pluck, than the mind is from this organ of its volition. Indeed, we must all feel that the pulse which beats at the wrist, has nothing whatever to do with our will. We may use the hand for our purposes, but its machinery, its vitality, do not in any way depend upon our dictates. The action of the heart, the circulation of the blood, are carried on by laws to which the mind is no party. Had it been otherwise, a single act of omission in ordering the requisite functions on our part, might bring life to a premature termination. The fracture of a small filament in the admirable tracery of nervous cords which unites many organs in sympathy, would produce spasm, suffocation, and death. Thus, then, we have two principles of vitality in us,—one, that of the mind,—the other, that of the frame in which it is enveloped; each perfectly distinct, and manifestly the work of a Superior Intelligence, who has given us a control over the operations of both, but has taught us the secret of immortality, in the laws which disclose their separate existence. The planets move round the sun by his attraction; the blood circulates through our frame by no relation to the mind. The planets and the sun itself shall perish; the blood shall cease to circulate, and the fairest fabric of mortality shall moulder in the dust; but the mind lives independently of matter, as matter does of mind, and can no more be affected, as to its vital essence, by the destruction of the body, than Sirius would be by the extinction of our entire solar system.

Not only are the vital functions of the body independent of our will, but each of our organs has been endowed, without any consent or previous knowledge on our part, with powers admirably suited to its purpose; powers which are not the result of life either of the mind or the body, but of special legislation, founded on premeditated design, and accomplishing an adaptation of means to end, wonderful for their perfection. Thus the heart, to which the lover appeals as the seat of his ardent feelings, as the most sensible organ of his system, may be rudely pressed by the hand without conveying to him the sensation that it has been touched. Harvey's celebrated experiment puts this fact beyond a doubt.

It happened that a youth of the noble family of Montgomerie had his interior exposed in an extraordinary manner, in consequence of an abscess in the side of the chest, which was caused by a fall. The youth was introduced to the presence of Charles the First, and Harvey, putting one hand through the aperture, grasped the heart, and so held it for some time, without the young man being at all conscious that any new object was in contact with it. Other observations have since confirmed this discovery, and the heart is now universally declared by medical men to be insensible! Nevertheless, we all well know that the heart is affected not only by the emotions of the mind, but by every change that takes place in the condition of the body. Here, then, is a complete proof of design. The heart insensible to *touch*, which, from its internal position, it was never intended to experience, is yet sensibly alive to every variation in the circulation of the blood, and sympathizes in the strictest manner with the powers of the constitution. There is nothing, however, in the mere principle of life, still less in the physical texture of the heart, to give it insensibility to touch, and sensibility to feeling of the most active and refined description. As life is animation added to the body when formed, so this peculiar susceptibility of the heart is an endowment added to the organ by Him who made it.—*Quarterly Review.*

THE STOMACH.—"I firmly believe that almost every malady of the human frame is, either by high-ways or by-ways, connected with the stomach. The woes of every other member are founded on your belly timber; and I must own, I never see a fashionable physician mysteriously consulting the pulse of his patient, but I feel a desire to exclaim,—Why not tell the poor gentleman at once, 'Sir, you have eaten too much; you've drunk too much, and you have not taken exercise enough!' The human frame was not created imperfect. It is we ourselves who have made it so. There exists no donkey in creation so overladen as our stomachs."—*Bubbles from Nassau.*

How frail and inconsistent is men! How different does he think and act even for himself, in different circumstances! How strangely does the same passion of pride seek for gratification from contrary causes, from pursuing ideal good, and from giving up that which is attainable and real! One moment he strains at a gnat, and applauds himself for sagacity, in the next he does not suspect himself of credulity when he swallows a camel.—PARR.

LONGEVITY.—In the third volume of Mr. Sharon Turner's *Sacred History of the World*, is the following passage:

"The salubrity of England, either from its climate, its manners, or its intellectual cultivation, to the more advanced periods of social life, is indicated by the fact that, in 1834, it was calculated that there were then seventy peers in the House of Lords, who were between seventy and eighty years of age, or a sixth part of the 426 of whom the House, including the bishops, consists. Eleven of these were noticed as octogenarians, or still older. These eleven peers were thus represented:—

Lord Wodehouse	93	Lord St. Helens	81
Lord Lynedoch	84	Earl Fortescue	81
Lord Stowell	89	Earl of Ranfurley	80
Lord Eldon	83	Earl Powis	80
Lord Scarsdale	83	Lord Middleton	80
Lord Carrington	82		

To these might have been added the Bishop of Norwich, the Earl of Egremont, and Lord Rolle, the two former of whom have paid the debt of nature: the last is still living.

USE AND MANUFACTURE OF BELLS

The employment of sonorous metal in the form of bells, for the purpose of producing musical sounds, is of very great antiquity. We read of it in the Holy Scriptures, where bells are mentioned as being employed in religious ceremonies, and it was ordered by Moses that the lower part of the blue robe of the high priest should be hung with pomegranates and small bells. The same custom is noticed with reference to the kings of Persia; and in many parts of the East, at the present day, the mistress of the house has the lower part of her dress furnished with hollow pieces of metal, containing small stones, and these producing a sound as she moves, warn the domestics of her approach. Bells were used to decorate the heads of the war-horses of the Jews, in order to accustom them to noise. The Greeks and the Romans also used bells on many occasions, religious, civil, and military; in funeral processions, at sacrifices, and to announce the hour of bathing, and of rising in the morning; they were also rung at executions.

But although bells were known thus early, the manufacture of them appears to have been confined to those of a small size. The first church bells are supposed to have been cast at Nola, in Campania, in the year 400; but it is not until the beginning of the sixth century that their employment is known to a certainty. From this time, their use in churches rapidly spread in all directions; and at the end of the ninth century, scarcely a church or monastery, of any note, was unprovided with these lively harbingers of religious duties.

Among the Roman Catholics, many superstitious notions were attached to the employment and properties of bells. A church bell is noticed by antiquaries, inscribed with the following Latin verses, in which its valuable properties are summed up:—

> Funera plango, fulgura frango, sabbata pango,
> Excito lentos, dissipo ventos, paco cruentos;

which may be thus translated,—

> I strike at a funeral, I disperse the thunder, I announce the sabbath,
> I excite the lukewarm, I dissipate tempests, I soften the hearts of cruel men.

In allusion to another superstition regarding bells, we find in the *Golden Legend* of Wynken de Worde, one of our early English printers, that, "It is said, the evil spirytes, that ben in the regyon of thayre, doubte moche when they here the belles rongen: and this is the cause why the belles ben rongen when it thondreth, and when grete tempeste and outrages of wether happen, to the end that the feinds and wycked spirytes shold be abashed and flee, and cease of the movynge of tempeste."

The custom of naming bells and blessing them with certain religious ceremonies exists in the Roman church. Before bells are hung they are washed, crossed, blessed, and named, by the bishop.

The Chinese, have been from early times famous for the magnitude of their bells. The city of Nankin formerly possessed some of a very large size, but their weight was so enormous, that they brought down the tower in which they were hung. One of these bells is twelve feet in height, and seven in diameter: it is computed to weigh as much as two tons and a half. These bells were cast about three hundred years ago: they are four in number, and are named, the hanger, *tchoui;* the eater, *che;* the sleeper, *choui;* the will, *si.* A French author mentions seven other bells at Pekin, each of which weighs the enormous weight of six tons. But some of the bells in Russia exceed even these in weight; one in the church of St. Ivan's at Moscow weighs 127,836 lbs. "This was the largest bell known until Bovis Godenuf gave the cathedral of that city a bell weighing 288,000 lbs. This was again surpassed by the bell cast at the expense of the empress Anne, which weighs at the lowest computation 432,000 lbs., or between twenty-one and twenty-two tons*."

The largest bells in England are at Christchurch College, Oxford, weighing 17,000 lbs.; St. Paul's, London, 11,474 lbs.; and the great Tom of Lincoln, 10,854 lbs., the heaviest of these being only one-twentieth the weight of the Russian bell.

Although the English have nothing to boast of as to the size of their church bells, when compared with those of other nations, they have practised almost exclusively the art of bell-ringing. From a series of bells of different sizes, properly tuned, so as to produce when struck, the different notes of the gamut, many harmonious effects are obtained.

The practice of ringing bells in changes or in regular peals is said to be peculiar to England; the custom seems to have commenced with our Saxon ancestors, and to have been common before the Conquest. The tolling of a bell is nothing more than producing a sound by a stroke of the clapper against the side of the bell, the bell itself being in a pendant position, and at rest; but in ringing, the bell is elevated to a horizontal position, so that, by means of a wheel and rope, the clapper strikes forcibly on one side as it ascends, and on the other side on its return downwards, producing at each stroke a sound.

Bell-ringing having been reduced to a science in this country, has caused great attention to be paid to the process of casting bells, and preparing the metal.

Bell-metal is composed of tin and copper; but the proportions vary according to the size of the bell, or the judgment of the founder: the usual quantities are 23 lbs. of tin to 100 lbs. of copper. In large bells more copper is added, and sometimes in very small ones a portion of silver is used, which is said to improve the sweetness of the tone materially.

The method of casting a large bell is in the first instance to form a *coré* which is to fill the inside of the bell while casting. For this purpose a hole is dug large enough to contain the bell, and to allow a free passage to the workman, during the operation of moulding. In the spot to be occupied by the centre of the mould, a stake is firmly driven into the earth; on the top of this stake is an iron peg, on which the guage or compasses of the moulder revolves; the stake is surrounded, at the lower end, with solid brickwork. This is called the *millstone.* A great portion of the space to be occupied by the core is filled up with bricks and earth, a hollow chamber being left in the centre, into which in a subsequent part of the process, hot coals are introduced for the purpose of drying the mould. This rough foundation is afterwards covered with successive layers of fine cohesive earth and sand, mixed with horse or hog's dung, the compasses being frequently applied for the purpose of ascertaining the progress of the work, and a moulding-board used to preserve the correct curve. At intervals, as the work proceeds, the mould is frequently dried, and any imperfections which may arise from shrinking are corrected by the moulder, by the addition of fresh compost; and the core is again dried and carefully smoothed over.

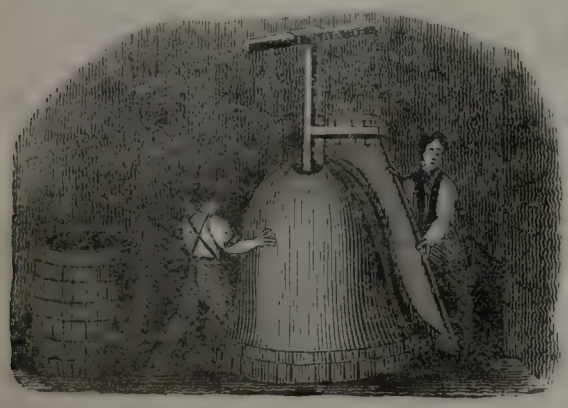
The core being complete, the *model* of the bell itself is next formed, by a composition of moulding loam and hair, which is applied to the core by layers, the last being very thin; the last layer is a mixture of wax and grease. The model being thus complete, the *shell* of the mould is formed; the first layer of this last coating is composed of earth, sifted

* See *Saturday Magazine*, Vol. III., p. 7, for a description of this monstrous bell.

very fine, and mixed with cow-hair, to make it adhere, and tempered with water to a state of semi-fluidity, when it is poured upon the waxen mould, and readily adapts itself to all its parts, filling in the ornaments, or writing, with which it is marked.

Two or three of these coatings having been applied, a fire is again lighted in the core, by which the shell is dried, and the wax, leaving its impression in the sand, melted off. After this other layers of the moulding loam are laid on, a quantity of hemp being spread intermediately, to bind the mass more securely together; the compasses are still employed, in order to secure a degree of equality in the thickness of the shell.

When the moulding is completed, and all the parts sufficiently dry, the hollow of the core is filled with sand, through an opening left at the head of the shell. Five or six pieces of wood, two or three feet long, are placed about the mill-stone, and under the lower part of the *shell*; between these and the *mould*, wooden wedges are driven to loosen the *model* and the shell, the latter being lifted off, and the former broken and removed from the core: the shell, after being blackened inside by the burning of straw, to give smoothness to the casting, is lowered exactly over the core; the cap containing the perforations for the rings or ears is affixed, and cuts are made for the escape of air, and admission of the metal, after which the whole is carefully surrounded in the pit with sand, well rammed about the shell. A gutter being made from the furnace, along which the metal, when in a state of fusion, is allowed to flow into the mould in the pit, until it has filled every part.



MOULDING A LARGE BELL

In Germany, and other parts of the Continent, the casting of a large bell is celebrated as a holiday by all the neighbourhood of the foundry, and is attended with much ceremony. The following extracts are from Lord Leveson Gower's translation of the celebrated "Song of the Bell," of Schiller. We have already alluded to this poem in the *Saturday Magazine*, and now add a more lengthened extract, embracing the whole of the descriptive part of the subject.

Through yonder clay at close of day
The molten mass shall run,
The fashioned bell itself shall tell
Our weary task is done.
Choose me splinters of the pine,
Choose them clean and dry
That the spiry flame may shine
Up the tube on high.
Pour the molten copper in,
Mix it with the bubbling tin,
That the viscous mass may flow,
Duly through the mouth below.

That offspring of consuming fire,
And man's creative hand,
High from the summit of the spire,
Shall murmur o'er the land.
Like flattery's voice, from yonder tower
Shall speak the genius of the hour,—
Shall bid the sons of mirth be glad,
Shall tell of sorrow to the sad,
Reflection to the wise;
Shall add to superstitious fear,
And peal on rapt devotion's ear
The sounds of Paradise.
And all his changeful fate brings down
On suffering man below,
Shall murmur from its metal crown,
Or be it joy or woe.

* * * *

Browner see the mass appearing;
Now the rod I dip within—
Should it glaze it, close adhering,
We may then our work begin.
Come pour the tide,
And be it tried,
To know if yet with favouring sign,
The ruder and the weak combine.

* * * *

Lift the liberating latch,
Free the metals on their way,—
First a hasty moment snatch,
Heaven's protecting aid to pray!
Strike the stopper! out it goes,—
Heaven protect us!—now it flows.
Shooting, sparkling through the mould,
Now the fluid mass has rolled.

* * * *

Through the moulded chambers gliding,
Now the metal fills the soil;
May the fashioned mass, subsiding,
Prove deserving of our toil.

* * * *

Short repose, an instant courting,
Till the bell has cooled, we rest——
Like the bird in groves disporting,
Each may play as likes him best.

* * * *

Break me down the mighty mould,
It has reached its master's aim,
Let the longing eye behold
The created child of flame.
Break it down, though strong it fit,
Swing the hammer till it split.
Would we raise the living bell,
We must break its mortal shell.
The master knows the time to shiver
The moulded form with cunning hand—

* * * *

Lo from the clay asunder parting,
Untarnished by the lapse of years,
Rays of metallic lustre darting,
All freshly bright the bell appears.

* * * *

Come, close your ranks, your counsel tell,
To bless and consecrate the bell—
CONCORDIAS' name may suit it well,
And wide may it extend the call
Of union and of peace to all;—
Such then be its solemn name,
And this its object and its aim.

* * * *

And now, with many a rope suspending,
Come, swing the monarch's weight on high,
By our last toil, its throne ascending,
To rule the azure canopy.
Stretch the pulley—now he springs!
Yet another—now he swings!
Let him bid the land rejoice—
Peace be on his earliest voice!

THE most necessary talent of a man of conversation, is a good judgment. He that has this in perfection is master of his companion, without letting him see it; and has the same advantage over men of any other qualifications what soever, as one that can see would have over a blind man of ten times his strength.—STEELE.

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THE CASTLE OF HEIDELBERG.

COURT-YARD OF HEIDELBERG CASTLE.

ALTHOUGH a brief account of the Castle of Heidelberg has already appeared in this work*, yet the great beauty, both picturesque and architectural, of this far-famed ruin, and its long period of historical importance, authorize the insertion of a further description; which, being chiefly drawn from the ancient archives of the place, will embrace a summary of its entire history.

In order to commence from the earliest known date, we must relate that the appellation *Heidelberg Castle* was originally borne by a fortress situated about half a mile above the present magnificent structure, which, both according to tradition, and the nature of the foundations still visible, was built by the Romans as a defence against the native hordes infesting the valley of the Neckar. They were further protected by a wall leading from this fortress down to the river, which, terminating in a tower, controlled any attack by water. This tower, with a portion of the wall, are still discernible in an old building called the *Marstall*, now used as a lying-in hospital. After the retreat of the Romans, from Germany, this upper fortress was maintained as stronghold, and subsequently became the residence of the earlier *Pfalzgrafen*, or Palatinate Counts. The first historical notice of these potentates, which can be safely quoted, relates that Conrad von Hohenstaufen, (born 1127,) Duke of Suabia, and half-brother of Frederic Barbarossa, Emperor of Germany, resided at this fortress, which we will distinguish as the *old* Castle, and possessing large estates on the Rhine, was created by his brother Pfalzgraf of the Rhine. He added largely to the Castle, built the Benedictine monastery at Schönau, and converted a cloister of the same order, situated at Neuburg, about a mile up the Neckar, into a convent for ladies of rank. (This building still exists under its original name of the *Stift Neuburg*, and is occupied as a Summer residence by a gentleman of large fortune.)

Conrad died at Heidelberg, 1195, leaving an only daughter Agnes, who married Henry of Brunswick, to whom devolved the government. By her he had two children, Henry and Agnes, and residing chiefly on his patrimonial lands, in no way contributed to the prosperity of Heidelberg. His son and successor survived him but three years, dying childless at the age of twenty. Upon this event the Emperor, Frederic the Second, (the Emperors of Germany having, in those times, the arbitration of such matters, and appointing and deposing the lesser powers as they pleased,) nominated Louis the First of Bavaria, of the house of Wittelsbach, successor to the Palatinate lands. The people, however, resisted this choice, took their appointed sovereign prisoner, and only released him at a high ransom. By a marriage of policy between Otho, son of Louis, and Agnes, daughter of the late count, matters were seemingly adjusted, and Louis permitted to reside in comparative peace at the old Castle, but his bloody murder, which

* See *Saturday Magazine*, Vol. III., p. 139.

took place six years later, in 1231, proves that there were still powerful malcontents around him. His son Otho succeeding, the hereditary line was continued. This prince is the first whom we find styled Pfalzgraf and *Churfürst*—a title derived from the old German word *kuren*, to choose, and *fürst*, a prince, and borne as a distinction by those reigning sovereigns who possessed the privilege of electing the emperors of Germany; we render it fitly by the term *Elector*. Otho united the Palatinate and Bavarian estates, purchased additional lands, and is supposed to have laid the foundation of the lower Castle, of which this account especially treats.

This splendid structure stands upon a platform of rock about three hundred feet above the river, originally called the *Jettenbühl*; from a tradition of one *Jetta*, a heathen prophetess who dwelt in a chapel upon this site, and to whom, being in high repute for her miracles and oracles, the people flocked from all countries. This personage was seldom visible, but the prophetic words emanated from a window of the chapel, and were caught by the crowd assembled beneath. One of her prophecies which have been handed down to the present generation, testifies that palaces in which kings should reside, should cover her lowly hill, and that numerous buildings should occupy the valley beneath. And truly, if all her peeps into futurity proved as clear-sighted, she duly earned her reputation. Further, the tale goes, that having wandered one day through the woods till she reached a certain fountain, and a cloud, we conclude, being drawn over her prophetic vision, she was surprised by a savage she-wolf, who quickly put an end to the prophetess of the Jettenbühl. The scene of this tragic event still bears the name of the *Wolfsbrunnen*, or Wolf's Fountain. It lies in a picturesque hollow about a mile from the town, and is to this day resorted to, without any apprehension of a similar fate, by the youth and beauty of Heidelberg.

But to return to the *Pfalzgrafen*. To Otho succeeded Louis the Severe, who, in his connubial transactions, somewhat resembled our Henry the Eighth, having married three wives, one of whom he beheaded. This count dying in 1295, was succeeded by his son Rudolph the First, whose administration is marked as a period of much suffering to the Castle and surrounding dominions. He was driven from his possessions by the Emperor Albert, and is supposed to have died in Austria. The succession, nevertheless, was bestowed upon his son, Adolphus the Simple, who, preferring a life of indolence to the government of broad lands, surrendered the sceptre to his brother Rudolph the Second, not, however, till he had restored the Castle to a habitable condition. Tenth on the line of succession now appears Rupert the First, brother of Rudolph, born 1309, whose name is conspicuous as the author of numerous benefits to the country, and especially as the founder of the Heidelberg university, whose flourishing schools still remain a monument of his enlightened liberality. He it was who first resided regularly at Heidelberg, and added largely to both town and Castle. He died without issue at the advanced age of eighty-one, and the government devolved upon Rupert the Second, son of Adolphus the Simple, who, however, seems to have inherited less of his father's than of his uncle's nature, for we find him seeking the advancement of his people, driving the Jews out of the town, an act considered meritorious in those times, and presenting thirteen of the deserted houses to the university. This Pfalzgraf was succeeded, after a reign of eight years, by his son Rupert the Third, elected, in 1400, King of Rome, and crowned as such at Cologne, in 1401. He built that part of the Castle called to this day the Rupert building, and which forms one of the most ancient and picturesque portions still remaining. In his regal capacity he resided chiefly at Oppenheim, but was buried at Heidelberg, having equally divided the Palatinate lands among his four sons.

Louis the Third, the Bearded, or Pious, received, as eldest son, Heidelberg for his portion, and may be considered as the founder of the Heidelberg line. He married in 1402, Blanche, daughter of Henry the Fourth of England; the first connexion of this state with our country, to which it has subsequently been so vitally allied. In 1414 and 1417, Louis attended the church convocations at Constance, where John the Twenty-second, the deposed Pope, was committed to his charge, and confined for some time at Heidelberg, and ultimately at Manheim. This Prince contributed much to the progress of the university and improvement of the Castle and town. He completed the fine church of the Holy Ghost in the market-place, which had been commenced under Rupert the First, and dying in his sixtieth year, was interred within its walls. To him succeeded his son Louis the Fourth, who becoming entangled in some petty wars, died, it is said, of chagrin, in his thirtieth year, leaving an only son, Philip, in the cradle. His brother, Frederic the First, surnamed the Conqueror, was appointed regent to the infant prince, and subsequently reigned conjointly with him. In those times the law of primogeniture was but partially enforced, and in several instances we find brothers wielding the Palatinate sceptre together. Frederic was an excellent Regent; he strengthened and enlarged the Castle, and although engaged in a succession of wars, contrived that they should all conduce to the prosperity and aggrandizement of his states. He was connected in a left-handed marriage with the beautiful Clara Dettin, of Augsburg, and dying in 1476, was buried by his own desire in the dress of a monk, in a Carmelite Cloister he had founded at Heidelberg; leaving Philip the First, or the Sincere, to govern alone. This prince united to a chivalrous nature, a great taste for the politer arts. By his summons, many of the literati of that period resorted to his court, and were detained in the service of the university.

In the year 1484, a high tournament was held in the great court of the Castle, to which all the titled and gentle blood, far and near, were bidden. This period calls forth all our liveliest conceptions of chivalrous magnificence, and never, perhaps, was this lordly Castle worthier tenanted than in good Count Philip's time. Tradition still tells of the valour of the knights, the beauty of the dames, and the wine and wassail which flowed around; and, although the great tun * was not then in being, there was, doubtless, as little lack of mouths to drain, as of vessels to contain the produce of the Neckar vineyards. A few years later, the Emperor Maximilian honoured this Pfalzgraf with a visit, and was received with all the pomp of the times. About this period, also, as the story goes, a pike was caught in the royal ponds at Kaiserslautern, weighing 350 lbs. From an inscription upon a ring round its neck, it appeared that it had been placed there in 1230, by the Emperor Frederic the Second; having thus enjoyed the good things of this life during an interval of 267 years and upwards. This is, fortunately, the only instance on record of a fresh-water fish of these majestic dimensions, otherwise a race of sharks weighing twenty-five stone, might have been rather an awkward addition to our annals of natural history.

* See *Saturday Magazine*, Vol. III., p. 140.

In spite of the hospitality which had been shown to the Emperor, Count Philip was not secured from hostilities; for a year later, on his claiming the Bavarian succession for his son, Maximilian declared him under the ban, and sent a numerous army against the Palatinate. Both the town and Castle, however, were so well manned and fortified, and the inhabitants so devoted to their count, that the enemy only caused a temporary annoyance, and soon evacuated the land. Philip died 1508, and was buried in the church of the Holy Ghost.

Louis the Fifth succeeded to the government, and pursued his father's plans of improvement. He encouraged learning, protected the university, and greatly added to the size and strength of the Castle. He it was who commenced that formidable bulwark round the entire building, part of which, towards the west, is still standing, a monument of strength. Besides this, the so called Thick-tower, overlooking the town, of which only a section now remains; the square-tower, still in good preservation, the bridge, the bridge-house, the Stückgarten, &c., &c., were all erections of his reign. In 1524, this Elector proclaimed a trial of cross-bow shooting, at which many German potentates attended. This, however, appears the pretext rather than the object of their meeting; which was, in reality, to concert some means of arresting the progress of those intestine or peasant wars, which at that time ravaged Germany. In 1537, we read of a tremendous thunderstorm which broke over Heidelberg, when the lightning striking the older Castle above, which had been maintained merely as a fortress and magazine for powder, the whole structure was rent into the air, with an explosion audible for miles around. Nor did the damage end here, for the huge masses of masonry falling on the town and Castle beneath, crushed whole buildings, and occasioned much loss of life and property.

Louis the Fifth, dying 1544, was buried in the church of the Holy Ghost, and succeeded by his brother, Frederic the Second. This prince, although he had blamed his predecessor for his expensive love of building, continued, nevertheless, the improvements on a large scale; and among other additions, raised the octagon-tower, which still forms one of the most beautiful features of the ruin. He rendered great services to the Emperor, and was permitted in requital, to bear the Reich's Apfel or imperial crown in his arms, which, after this date, repeatedly occurs in the escutcheons about the Castle. Frederic appears to have been a gay bachelor; he always purposed marrying into some royal family, and for this end entered into successive negotiations with different courts, but did not finally take upon himself the yoke of matrimony till he had completed his 50th year, when his choice fell on Dorothea, daughter of the deposed king of Sweden, by whom he had no children. He died in 1556, and was buried with his forefathers. With him expired the Heidelberg line, and we can discover no connexion either immediate or collateral, with Otho Henry, of the house of Neuburg, who succeeded to the Palatinate states.

This prince, although bound by no hereditary ties, proved an excellent parent to his newly acquired dominions, and by the height of architectural splendour to which he raised the Castle, has established a claim on the reverence of all artists and antiquarians. Having, during his youth, visited the Holy Land, and collected a number of Greek and Arabian manuscripts, he presented them to the university, and thereby founded the famous library which was subsequently nearly destroyed during the thirty years war. During his travels in Italy he also cultivated his taste for architecture; and being furnished with designs from Raphael and Julio Romano, applied them in the erection of that splendid portion, called to this day, Otho Henry's building. This forms the west side of the Tournament Court, and contains the *Ritter Saal*, or Knight's Hall, and a princely suite of apartments, the façade of which, adorned with colossal figures from Scripture and Pagan history, offers a unique specimen of the florid and gorgeous architecture of those times. All these improvements were effected in the marvellously short space of three years, for we find the death of this spirited sovereign recorded in 1559, who dying without issue, the states devolved to Frederic the Third, of the house of Simmern, also connected by no consanguinity that we can discover, either with his immediate or more remote predecessors.

This Prince introduced the Calvinistic doctrines in opposition to those of Luther, which is the first mention we have obtained of religious disputes in the history of the Palatinate. His controversial occupations, probably left him no time for more secular pursuits,—at any rate we perceive no additions or alterations to the Castle recorded in this reign. He died in 1576, and was buried in the church of the Holy Ghost, succeeded by his son Louis the Sixth, who differing on doctrinal points from his father, revived the religion of Luther, and dismissed the entire Calvinistic court. This Elector also appears to have left the Castle as he found it, and dying in 1583, was gathered to his forefathers. He left a young son, but was succeeded by his brother, John Casimir, styled Pfalzgraf and Administrator, who officiated as Regent to the young prince. This former is celebrated as the founder of the first great tun, and of the building containing it. A small chapel in the upper part communicated with the cellar below, a circumstance which savours somewhat of the monkish habits of his predecessors. In this reign, the doctrines of these two reformers again changed places, John Casimir being a zealous disciple of Calvin, and again the court and state were cleared of all obnoxious dependants.

ILLUSTRATIONS OF THE BIBLE FROM THE MONUMENTS OF ANTIQUITY.

No. VI.

The Establishment of the Israelites in the Land of Goshen.

The Egyptians had long been exposed to the ravages of the wandering tribes, who possessed the Arabian peninsula, and who were sometimes robbers and sometimes merchants. Though commercial intercourse was maintained with these tribes, as we found exemplified in the history of Joseph, who was brought into Egypt by one of their mercantile caravans, yet they were always viewed with jealousy and suspicion. When the brethren of Joseph, therefore, came down to Egypt for the purchase of corn, it was by no means an improbable charge to accuse them of being spies, come "to see the nakedness of the land." *Nakedness* here does not allude to the barrenness produced by the seven years of famine, but to the want of natural or artificial defences on the eastern frontier of Egypt, through which most invaders have entered that land from the days of the Hycsos down to those of the Ayubite sultans. Though the sons of Israel denied the charge, we find that they did not deem it improbable or unnatural, for they refute it by showing that they did not belong to a wandering tribe, but to a stationary family. "Thy

servants are twelve brethren, the sons of one man in the land of Canaan." (Gen. xlii. 13). And Joseph's proof of their integrity, "send one of you, and let him fetch your brother," manifestly shows that it was a means of determining whether they were wanderers, like the Hycsos, or settled, and, therefore, peaceful agriculturists.

Now the monuments abound with proofs that such suspicions were not unfounded, for they exhibit the Egyptians as engaged in constant war with the predatory tribes on their eastern frontier, and the cruelty with which the captives were treated, proves that the hostility engendered by these wars was more deep and deadly than was usual, even in the most savage feuds of other nations.

We find indeed that the Egyptians extended their hatred of the wandering races even to the innocent; when the honesty and amicable disposition of the children of Israel were so fully recognised, that they were invited to dine with the prime minister, we find it recorded that "the Egyptians would not eat bread with the Hebrews, for that is an abomination to the Egyptians." This passage serves to explain a circumstance which has been the cause of much controversy among the commentators,—the reason why the descendants of Abraham were named Hebrews. Some assert that they were thus called from Heber, one of their ancestors,—an untenable hypothesis, as there is no circumstance recorded respecting Heber, which would entitle him to give his name to a tribe; others, with more probability, derive the name from a Hebrew verb, which signifies "to pass over;" but they restrict the allusion to Abraham's having "passed over" the Euphrates, when he came from the land of his fathers to dwell in Canaan. But since the word Hebrew signifies "a passenger," it is evident that it may be received as a designation of the wandering and pastoral life of the early patriarch. Abraham, Isaac, and Jacob were "dwellers in tents," not inhabitants of cities; the Egyptians had no cause for hating the descendants of Heber, or the offspring of any one who had come from beyond the Euphrates, but they had every reason to detest nomades, or wanderers, and the very name of Hebrew intimated that those so called led a wandering life.

The circumstances of the entertainment given by Joseph to his brethren, can only be understood by a reference to the oriental customs at feasts, which have varied very little since the days of the Pharaohs. The guests did not, as with us, sit down to the same table, but a separate tray or table was provided for every two, or at most every three guests, from

AN ALTAR-TABLE, WITH FOWLS, BREAD, FRUITS, &c.

which they furnished themselves, without paying any attention to their neighbours. It was a distinguished mark of honour to give some eminent guest a tray or table to himself. There are even now no removes or changes of courses at these entertainments; all the viands are piled together on the tray or table, and the number, variety, and delicacy of the dishes are usually proportioned to the rank of the guest.

Hereafter we shall have occasion to notice, that a similar plan was followed in making offerings to the gods; indeed, it is exceedingly probable, that the Egyptians derived their first notion of an altar from the banquetting tables of their kings and princes.

This custom of ranging separate trays or tables for groups of guests, greatly facilitated the arrangement of the company according to rank, a circumstance to which the orientals have ever attributed considerable importance. In the narrative of the entertainment given by Joseph to his brethren, we are told "they sat before him, the first-born according to his birth-right, and the youngest according to his youth; and the men marvelled one at another." (Gen. xliii. 33). Their surprise was occasioned not by the circumstance of seeing a distinction made, but by the accuracy with which they were arranged in their proper order, as they supposed there were no means of determining their relative seniority. A similar circumstance occurs in an ancient Chinese tale, where the order in which an apparent stranger salutes the members of his family, leads to the discovery of his identity. Benjamin's portion was probably served on a separate tray or table; we are told that "his mess was five times so much as that of any of his brethren;" whence some persons have very absurdly inferred, that he ate five times so much as they did, which, of course, would be impossible, unless they were very niggardly supplied; but from what we have already said, the meaning is clear, the expression simply indicates that a greater variety of delicacies were offered for his selection.

The monuments show us that, in the very earliest ages, Egyptian luxury had led to the invention of countless forms of pastry and confectionary, as we had occasion to remark in noticing the history of Pharaoh's baker.

When his brethren were about to depart, Joseph directed his steward to conceal his silver-cup in the sack of Benjamin. We have more than once noticed the early use of ornaments formed from the precious metals among the Egyptians; extraordinary attention was paid to the form and decorations of their drinking cups, and we find that some of the richest tributes which the Pharaohs received from the southern provinces, especially Meroe and Nubia, were gold and siver vases. Joseph's steward declares that this cup was not only used for drinking, but also for divination. "Is not this it in which my lord drinketh, and whereby indeed he divineth?" (Genesis xliv. 5.) Divination by the cup is only one form of the divination by a fluid mirror, which, from the earliest ages, has prevailed in the East, and which, after the Crusades, became a popular form of witchcraft in modern Europe. Indeed, the credulous and ignorant in some of the remoter districts of England, still believe that fortune-tellers can predict future events by inspecting the accidental arrangement of the grounds in a tea-cup or a coffee-cup. We cannot identify this form of divination on the monuments, but the most ancient traditions bear testimony to its prevalence; one of these intimates that those who conjure indiscreetly with the magic cup expose themselves to great danger, and it is possible that the circumstance was mentioned in order to terrify the sons of Jacob. It must be recollected, too, that it is Joseph's steward, not Joseph himself, who speaks of conjuring with the cup.

STORING THE CORN IN THE ROYAL GRANARIES.

After Joseph made himself known to his brethren, he sent "wagons" to bring his father and family down into Egypt; it appears that such vehicles were unknown, or, at least, uncommon, for the moment that Jacob saw them, he recognised the land from which they came. On the monuments, the only wheel-carriages usually seen, are the war-chariots; but it is manifest that the use of these conveyances must have led to the employment of wagons and similar vehicles for the transport not only of goods, but of women, children, and sick persons. Indeed, Joseph expressly intimates that such was the use for which these vehicles were intended. "Take you wagons out of the land of Egypt, for your little ones and for your wives." (Gen. xlv. 19.) Within a very recent period the representation of a four-wheel vehicle, extremely like a farming wagon, or wain, has been discovered among the paintings in a tomb, at Thebes, wherein the mummy of a person of high rank was found.

The policy which induced the reigning Pharaoh to give the land of Goshen to the colony of the Israelites, may readily be understood by a reference to the map of Egypt, and to what we have already said respecting the inveterate hostility between the Egyptians and the wandering tribes of Arabia and Syria. Goshen was the name of the rich pasturage districts between the eastern bank of the Nile, and the upper shores of the Red Sea. It was a frontier province exposed to the ravages of the Arabians and Syrians, and was almost useless to the Egyptians, whose habits and customs were utterly at variance with the usages of a nomade life. When we read that "every shepherd is an abomination to the Egyptians," (Gen. xlvi. 34,) we must not imagine with many commentators that they had any religious objection to the mere occupation of tending flocks and herds; indeed, so far was this from being the case, that we find an entire caste of herdsmen among the Egyptians, and flocks of sheep and goats, droves of black cattle, and herds of other tamed animals are frequently depicted on the monuments. The prejudice was against those restless tribes, from whose incursions they suffered so severely, and they probably feared that, if any native Egyptians settled in Goshen, they might gradually acquire a taste for a wandering life, and, perhaps, in the end, favour an invasion.

This enmity between agricultural and pastoral populations brought into close contact, is still exemplified on the north-eastern frontiers of Persia. Nothing can exceed the mutual contempt and rancorous hatred between the Turcomans and Tartars, who lead a nomadic life in the steppes and deserts north of the Oxus, and the settled agriculturists of Persia. They speak of each other with a virulence and affected contempt which could only have been engendered by centuries of mutual hatred and mutual injury. But with the Egyptians this natural enmity was systematized by the exertions of the priestly caste, who sanctified policy by religion, and forbade their followers even to partake of a social meal with the objects of their jealousy and their animosity.

The defenceless land of Goshen was, therefore, worse than useless to the Egyptians; it was the high road for the invasion of the pastoral tribes with whom, then, as now, a foray was esteemed an honourable enterprize, and it could not well be used as pasture, for the Egyptians employed to tend cattle in that region must have, in some degree, adopted the usages of their enemies. This sufficiently appears from the words which Pharaoh addressed to Joseph, "if thou knowest any men of activity among them, then make them rulers over my cattle." (Gen. xlvii. 6.) The Hebrew words translated "men of activity," more properly signify "men of military habits," such as the Israelites were likely to acquire by a nomade life, and of which they were certain to need the exercise in guarding the royal herds of a frontier province.

The policy of Pharaoh is now intelligible; as Dr. Hales very properly remarks, "Goshen formed the eastern barrier of Egypt towards Syria and Palestine—the quarters from which they most dreaded invasion—whose *nakedness* was now covered in a short time, by a numerous, a brave, and an industrious people: amply repaying, by the additional security and resources which they gave to Egypt, their hospitable reception and naturalization." And thus Joseph, while he provided for the comfort of his family, conferred an inestimable advantage on the monarch whom he served.

Two years of the famine alone had expired when Jacob and his posterity came down to colonize the land of Goshen. Five years yet remained during which the Egyptians had no resources but the royal granaries, which had been amply stored by the provident care of Joseph during the seven years of plenty. Nor is there any difficulty in supposing that the granaries could contain a sufficient supply for the entire population of Egypt during the space of seven years. The monuments contain ample proofs of the care that the Egyptians bestowed on the storing and preservation of corn, and the great extent of their granaries.

Some persons, indeed, have insinuated rather than expressed a doubt, of the possibility of preserving corn for so long a time; but in a climate so remarkably dry as that of Egypt, there is no limit to the period during which grain may be kept sound We

have seen some grapes and seeds taken out of the sepulchres, which were in the form being injured by being kept for three thousand years, but they still retained their germinating power, and we have actually seen a plant grown from one of them.

It was Joseph's policy to make the sovereign lord of the soil of Egypt, with the single exception of the land belonging to the priests. Hence the rental of Egypt was charged with its taxation, the sum paid for the support of the government being twenty per cent. or one-fifth of the entire produce. The correctness of this singular system is confirmed by the monuments, for we find a superintending secretary present at the measuring and measuring of the corn, as was shown in an earlier part of this series.

Both Jacob and Joseph were embalmed after their death, the body of the former was honourably removed to the land of Canaan, but Joseph's remains were not borne to the sepulchre of his fathers, until the Israelites entered the land of Canaan, after their departure from Egypt and wanderings in the desert. It is unnecessary to dwell upon the care with which the Egyptians preserved their dead; the mummies are too well known to require description. There are however, one or two circumstances mentioned in the Scripture narrative which require a few brief observations. When the Israelites had brought Jacob's body over the river Jordan, they made a halt for seven days to mingle their sorrow, "and when the inhabitants of the land, the Canaanites, saw the mourning in the floor of Atad, they said, This is a grievous mourning to the Egyptians; wherefore the name of it was called Abel-mizraim, (mourn of the Egyptians,) which is beyond Jordan." (Gen. l. 11.) In confirmation of the narrative, we find that no nation, ancient or modern, carried their lamentations for the dead to such an extravagant length as the Egyptians. We see the mourners at funerals depicted on the monuments rending their garments, casting dust upon their heads, beating their breasts, and using gestures that seem to belong to almost hopeless despair. Historians assure us that during the period of mourning, which varied with the rank of the deceased, the relatives and dependents abstained from the use of meat and wine, neglected their persons, and went about singing plaintive songs in honour of the departed. The Israelites adopted this custom, and it was retained by the Jews for many centuries after it had been disused in Egypt. But such a practice was looked upon as unmanly by warlike and nomadic races, and hence arose the surprise of the Canaanites, who regarded such grief as so great a novelty, that they perpetuated the memory by giving a new name to the place in which it occurred.

It is particularly mentioned that Joseph "was put in a coffin;" among the Egyptians coffins were used only in the burial of people of distinction, but when they were used, great care was taken in ornamenting and decorating them. The wood from which they were formed is of so lasting a nature, that some of these Egyptian coffins now to be seen in the British Museum, and other collections of antiquities, seem as fresh as if they had just come from the hand of the maker. Hence we see that there was no very great difficulty in the children of Israel bearing with them the body of Joseph at the time of the Exodus, and carrying it about with them during their wanderings in the desert. It was not until the conquest of Canaan was completed indeed that the body of the patriarch was committed to its final resting place: for we read in the book of Joshua, "And the bones of Joseph, which the children of Israel brought up out of Egypt, buried they in Shechem, in a parcel of ground which Jacob bought of the sons of Hamor, the father of Shechem, for an hundred pieces of silver, and it became the inheritance of the sons of Joseph." (Josh. xxiv. 32.

We have now gone summarily through the entire history of Joseph and his family, and have shown how fully every particular is confirmed by existing testimony, brought to light within our own day. We have next to investigate the history of the Israelites under altered circumstances, when "another king arose who knew not Joseph."

HISTORY OF WRITING MATERIALS.

THERE are few subjects capable of affording more interesting details than the history of the origin, progress, manufacture, and use of those articles of subsistence with which we are most familiar, and yet it happens that these are precisely the very subjects about which least is known. Whether the old adage that "familiarity breeds contempt" applies to a contempt for the knowledge of things familiar to us, we know not; but we certainly cannot understand the lurking wish which seeks for information respecting objects new and strange, and hesitates to inquire into the many curious properties and useful facts concerning familiar things. The very circumstance of facility and utility ought, we think, to afford an additional reason for acquiring information concerning such articles. We propose, therefore, to lay before our readers the history of three familiar and useful articles—Writing Materials. Having already introduced cursory notices concerning some of them, more especially those of the ancients, our chief business will now be with those of the moderns.

I. THE HISTORY OF A QUILL PEN.

It has been said, quaintly enough, that he who first introduced the use of goose-quills for pens, borrowed from the cobbler of Selby the instruments of weapons. Without discussing the justice or injustice of this satire upon a poor glover, we cannot deny that quill pens have been the messengers of vast benefit to mankind, inasmuch that it has been sarcastically remarked, that "had the ancients been acquainted with the art of employing quills as a material for pens, they would, probably, have dedicated to Minerva, —not the owl, but the goose. But some men have made the mistake of consuming the pen as the cause, instead of the mere instrument, of good. Thus, we have been told of one writer who had the pen with which he wrote one of his works, framed and glazed, and hung up over his mantel-piece; another pen was put into a golden casket by the great-grandson admirer of a celebrated writer, and no doubt it was with a feeling of much complacency and self-satisfaction that Holland, a physician of Coventry, who translated Pliny's *Natural History* into English, wrote the following lines:—

> With one sole pen I wrote this book,
> Made of a *grey goose quill*:
> A pen it was "when I took—
> A pen I leave it still.

It appears from the best testimony, that the mode of writing in the earliest times was not by the use of a fluid like ink, but by marking with a blunt point on tablets covered with a surface of wax; but when the Egyptian papyrus was devised, and a coloured liquid named, which could be used as ink, a new mode of procedure was devised, more likely to leave permanent traces of the writing. The instrument employed was a reed, the nature of which is not precisely

ascertained. Massey, in his *Treatise on the Origin of Letters*, mentions the use of reeds for writing among the Turks, Moors, and the oriental nations generally. The same author remarks, that whenever the word pen occurs in our English translation of the Old and New Testament, we must not understand it to mean a quill pen, but as an iron style or a reed, both of which the early nations used: the former was sharp at one end, like a pointed needle, and at the other end broad and blunt, to rub or scratch out what the writer wished to be erased.

Styles were much used among the Romans, they were made of different metals, also of ivory or bone. Wooden styles, or skewers, were found in the inkhorns at Herculaneum. The common material of styles was, however, iron; for we find that, as the Romans were not allowed to wear arms in the city, they often, in a fit of wrath, wounded each other with the writing-style, which they carried about them; hence the origin of the Italian *stiletto*. Respecting the reeds which were substituted for the blunt style and wax tablet, they are described as having been small, hard, round canes, about the size of a large swan's quill, and fashioned into shape much as we now do our quills. The supply of them used to be obtained chiefly from Egypt, Cairo, in Asia Minor, and Armenia. Chardin and Tournefort have described in their travels a sort of reed employed for this purpose, which grows in Persia, and which they considered as the best, at that time. These reeds are not originally hollow, but contain a pith, which, however, afterwards dries up in a manner similar to the membranous film in the barrels of our modern quills. These reeds are collected in some places bordering on the Persian Gulf, whence they are sent to every part of the East. They are said to be deposited for some months after they are cut, under a dunghill, when they assume a mixed black and yellow colour, acquire a fine polish and a considerable degree of hardness; this latter quality, however, is rendered of less value, by the circumstance that it is accompanied with a want of that elasticity which is so valuable a property in quill pens. This we can easily conceive, for although bamboo-reeds, and canes, are, in general, elastic in their complete form, yet when they are deprived of the internal parts by drying or any other process, the shell, or cylinder, is not likely to have much elastic property remaining.

Thus much for reed-pens, our information on which is but limited. Concerning quills, much doubt exists as to when they were first applied to the purposes of pens. An anonymous historian of Constantius says that they were so employed in the fifth century; but the oldest certain account is said to be a passage in some writings of Isidore, who died in the year 636, and who, in an enumeration of the materials used in writing, mentions reeds and feathers. There exists, also, a poem "on a pen," written in the same century, and to be found in the works of Adhelmus, who died in 709, and who was the first Saxon who wrote in Latin. We supply the following translation.

CONCERNING THE PEN OF THE WRITER.

The shining-white pelican (bittern) which sips with open throat,
The waters of the pool once produced one white.
I proceed direct to the whitening plains
And leave *fine marks on the shining-white ground**.
Shadowing the glistening grounds with *darkened windings*†.
Nor is it enough to *open a track over the plains*‡;
But rather a path continues by numerous turns
Which has carried to the heights of Heaven, those who wander not.

* Blue ink upon white paper. † Letters.
‡ Nor is it enough merely to scribble.

Strutt gives the annexed representation of the Anglo-Saxon pen and inkstand.

Another writer of the fifth century, quoted by Adrian de Valois, has been considered as affording proof of the use of quill pens at that time, by the following statement:—That Theodoric, King of the Ostrogoths, was so illiterate and stupid, that during the ten years of his reign he was not able to write five letters (THEOD) at the bottom of his edicts. For this reason the letters were cut for him, (we may suppose like our modern stencil plates,) in a plate of gold, and the plate being laid upon the paper, he then traced out the letters with a pen. The Emperor Justin, who flourished about the same period, is said to have shown a similar specimen of ignorance. Alquin, the friend and teacher of Charlemagne, mentions writing pens in the eighth century. After that time, proofs exist which put the question of their use beyond dispute. Mabillon saw a manuscript Gospel of the ninth century, in which the evangelists were represented with pens in their hands. *Calami* properly signify the reeds used by the ancients in writing; but modern authors have often used the term as a Latin word for pen, and it has been suggested that that was probably the proper term for quills, before their application to the purposes of pens. Reeds were used for a considerable time after the introduction of pens; and in monasteries and convents were frequently used for initial letters, as they made stronger marks than quills. By some letters of Erasmus to Reuchlin, we learn that the latter sent three writing reeds to Erasmus, who expressed a wish that Reuchlin, when he could procure more, would send some to a learned friend of his in England. Erasmus lived between 1467 and 1536, and it would from this appear that quills were scarce at that time. About the period of 1430, the familiar letters of the learned men of Italy, made mention of two inconveniences to which they were subject at that time, viz.; the difficulty of making good ink, and the scarcity of good quills.

The principal birds from which quills have been observed for making pens, are the goose, the swan, and the crow. Pelicans, and other birds, have also at different times, helped to furnish a portion of quills, but of all these, the goose has furnished by far the larger portion. So immense has become the number of quills employed, that in 1832, (notwithstanding the large consumption of steel pens,) thirty-three million, six hundred and sixty-eight thousand goose quills, were entered for home consumption, the greater part of which came from the Netherlands and Germany. An immense quantity is also imported from Russia and Poland, where vast flocks of geese are fed for the sake of their quills alone. The quantity exported from St. Petersburg varies from six to twenty-seven millions. We may form some idea of the number of geese which must be required to afford the supply, when we consider that each wing produces about five good quills, and that by proper management, a goose may afford twenty quills during the year. Hence, it is obvious, that the geese of Great Britain and Ireland could afford but a small supply.

The quills are the large feathers taken from the ends of the wing, and have different names according to the quality, which seem to depend principally on the part of the wing from which they are taken. The operation of preparing the quills is called quill-dressing, sometimes quill-*drawing*. The quills as they are taken from the bird, are covered with a

membranous skin, and have a toughness and softness which prevents their being easily split. They are also opaque, and the vascular membrane on the interior of the barrel adheres to it so strongly, that it is with difficulty detached. To remedy these defects, and to fit the quills for their destined purpose, is the business of the quill-dresser. He takes a large bundle of the quills, just as they are taken from the bird, and proceeds to separate them into three parcels,—differing from each other in the size and quality of the quills. The value is estimated both by the length and the thickness of the barrel; those having the largest and longest barrels being called "primes," which fetch the highest price in the market; the next best in quality are designated as "seconds," and the third, or smallest size, are called "pinions." The process of sorting being completed, the workmen proceed to "clarify" the quills, the principal object of which is to remove the membranous skin. The quills are plunged for a short time into heated sand: the heat of the sand makes the outer skin crack and peel off, which is further aided by scraping them with a sharp instrument; while, at the same time, the internal membrane becomes shrivelled up, and falls down to the point of the quill. The barrel of the quill is also hardened and rendered transparent by this process, in consequence of the heat consuming or drying up the oily matter resident in it. This latter effect is increased by repeated heatings; and when done for the purpose of hardening the quill, is called *dutching*, probably from the circumstance that the process was first adopted in Holland. (The term Dutch pens, is frequently applied to quills that have been passed through hot ashes, to remove the grosser fat and moisture, and to render them more transparent.) For the best pens, the process of dutching is repeated several times; but care is necessary, in order that the heating should not be carried so far as to injure the barrel. The quills after this process, are either of the colour of fine thin horn, or of an impure white; but before they are brought to market they undergo another process, with the two-fold object of giving them an uniform yellow colour, and to make them split more easily. They are dipped into diluted aquafortis or nitric acid, which has the effect desired. It is however thought by some, that this process, although it improves their beauty, injures their quality by making them too brittle, so that the slit is apt to run up on pressing with moderate firmness; for this reason, many persons who write much, such as clerks in mercantile houses, &c., frequently prefer a quill which has not undergone this process, as being more durable. The quills having been thus dressed and finished, a portion of the barb is stripped off, to occupy less room in packing, and the quills are tied up into bundles of twenty-five or fifty each, for the market.

The process of preparing the quills is, however, subject to some variation. Some dressers adopt the following mode. The quills are first moistened, not by immersion, but by dipping their extremities into water, and allowing the remaining parts to absorb moisture by capillary attraction. They are then heated in the fire or in a charcoal chaffer, and are passed quickly under an instrument with a fine edge, which flattens them in such a manner as to render them apparently useless. They are then scraped and again exposed to heat, whereby they assume their original form. This is a remarkable fact, and may be illustrated by taking a feather and crushing it with the hand so as to destroy it to all appearance; if we now expose it to the action of steam or a similar temperature, it will speedily assume its former condition.

Many of the quills after this preparation are cut into pens by means of the pen-cutter's knife, and are also trimmed. A pen-cutter will cut in a day two-thirds of a long thousand, consisting of 1200 according to the stationer's computation. A house in Shoe-Lane, London, cuts generally about 6,000,000 of pens yearly; and during the year 1834, notwithstanding the introduction of steel pens, it cut many more than it had done in any previous year. It is calculated by pen-makers, not more than one pen in ten is ever mended.

Swan-quills, which are very large in the barrel, are sometimes employed for pens, and though expensive at first, are, perhaps, not dearer ultimately than the smaller quills, their length and capacity of barrel compensating for the larger charge. Crow-quills are generally employed in drawing and designing, on account of the fine point to which they can be brought. They are particularly useful in that kind of etching which is intended to imitate prints. Quills may be hardened by steeping them in alum-water, at a boiling temperature for a few minutes.

There is a modern contrivance by which six or eight pens may be made out of one large quill. The narrow end, and also the stalk of the pen being cut off, leaving the barrel only remaining, the latter has a cylinder inserted through it, a little smaller than its own diameter. It is then placed in a machine in such a way that two cutting edges pass along the barrel, one on each side, by which the quill is cut longitudinally into two semi-cylindrical halves. These pieces are then placed in a groove with the convex side undermost, and the edges are made straight and smooth by having a plane run along them. These half-cylinders of quill are then cut into three or four pieces, according to their length, and each piece is operated on by the nibbing-machine, which is a sort of cutting press. A few strokes with a pen-knife then brings each little piece to the form of a pen, which, fixed in a handle, is fit for use.

THE VILLAGE CHURCH.

MINE be the rude and artless pile,
The ivy-mantled turret gray,
Within whose old unsculptured aisle,
The toil-worn peasant kneels to pray.
The whitened wall, the latticed pane,
The rustic porch, the oaken door;
Above, the rafters huge and plain,
Beneath, the footstep-graven floor.

Not here, where few could pomp admire,
The sons of wealth their pomp display;
They throng not here in gay attire,
Who come to gaze and not to pray:
No high-tuned choral peals surprise,
Enchanting fashion's languid train,
With arts ingenious to disguise
The bard of Sion's raptured strain.

But here, where lowly hearts are bowed,
By toil and sorrows gentler made,
Nor earth-born schemes, nor visions proud,
The unambitious breast invade;
More nearly is His Presence felt,
For whom the Heaven of Heaven expands
Its arch in vain, who never dwelt
In temples built by human hands.

By viewless Spirit of the air,
The soul's mysterious depths are stirred,
More fervent soars the heavenward prayer,
More deeply sinks the engrafted word:
O could my heart, in darker hour,
That calm and reverent mood recall,
How weak were then temptation's power
How frail the world's unhallowed thrall! R.

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QUEEN ELIZABETH; HER PROGRESSES AND PUBLIC PROCESSIONS. No. II.

PALACE OF PLACENTIA, AT GREENWICH, THE BIRTH-PLACE OF QUEEN ELIZABETH.

BIRTH AND CHILDHOOD OF ELIZABETH—DESCRIPTION OF THE ANCIENT PALACE OF GREENWICH.

Before entering upon a description of the Progresses and public Processions of Elizabeth while she occupied the throne, we shall proceed to notice the more prominent events of her early life, which still serve to invest some localities with interesting associations. Concerning the periods of her childhood and youth, in the reigns of her father and brother, a few very interesting details have been handed down to us; while that part of her life which was spent under the rule of her sister Mary, possesses considerable importance in an historical point of view.

Elizabeth was born at the palace of Greenwich, on the 7th of September, 1533. Her mother, Anne Boleyn, or more properly, Bullen, the daughter of Sir Thomas Bullen, had been privately married to King Henry the Eighth, some time in the month of January of the same year; and on the 23rd of May, his previous marriage with Catherine of Arragon had been declared by Archbishop Cranmer, to have been from the beginning, null and invalid.

The birth of Elizabeth was the occasion of much joy; in the account of a contemporary chronicler, we have a very lively and interesting description of the ceremonies which attended her christening:—

The 7th of September being Sunday, between three and foure of the clocke at afternoone, the Queene was delivered of a faire ladie: for whose good deliverance *Te Deum* was sung incontinently, and great preparation was made for the christning. The maior, and his brethren, and fortie of the chief citizens, were commanded to be at the christning of the Wednesdaie following. Upon which daie, the maior, Sir Stephen Peacocke, in a gowne of crimosin velvet, with his collar of esses, and all the aldermen in scarlet with collars and chains, and all the councell of the cittie with them, tooke their barge at one of the clocke; and the citizens had another barge, and so rowed to Greenwich, where were many lords, knights, and gentlemen assembled. All the walles between the king's pallace and the Fryers were hanged with arras, and all the way strewed with greene rushes. The Fryers church was also hanged with rich arras; the font was of silver, and stoode in the midst of the church three steps high, which was covered with a fine cloth; and divers gentlemen with aprones and towels about their neckes, gave attendance about it, that no filth should come to the fonte; over it hung a square canopie of crimosin sattin fringed with golde; about it was a rayle, covered with a redde saie; between the queere and body of the church was a close place with a pan of fire to make the childe readie.

When all things had been thus arranged, the child was brought to the hall, and the procession set forward. First went the citizens two and two; then the gentlemen, esquires, and chaplains; "next after them, the aldermen and the maior alone, and next the kinges counsell; then the kinges chappel in coaps; then barons, bishops, earles." The earl of Essex,—the last of the Bourchiers who had that title,—bore the covered basons gilt; after him, with a taper of virgin wax, came the marquess of Exeter, who was put to death by Henry three years afterwards; then the marquess of Dorset, (the father of Lady Jane Grey,) with the salt, and behind him the Lady Mary of Norfolk "bearing the crisome, which was very rich of pearle and stone." The child was borne by the dowager duchess of Norfolk, in a mantle of purple velvet, with a long train furred with ermine. On the right of the duchess was the duke of Norfolk with his marshal's rod, and on her left the duke of Suffolk; before went officers of arms; and afterwards came the countess of Kent, and the earls of Wiltshire and Derby supporting the train. Over the child was a rich canopy, borne by the Lord Rochford, the Lord Hussey, the Lord William Howard, and the

Lord Thomas Howard the elder. And lastly, came many ladies and gentlemen.

When the childe was come to the church doore, the Byshop of London* met it with divers byshoppes and abbots mitered, and beganne the observances of the sacrament. The god-father was Lorde Thomas Archbyshoppe of Canterburie†; the god-mothers were the olde Dutchesse of Norfolk and the olde Marchionesse of Dorset, widdowes; and the child was named ELIZABETH: and after that all things were done at the church doore, the child was brought to the font and christned; and that done, Garter chiefe king of armes cryed aloud, "God of his infinit goodnesse send prosperous life and long to the high and mighty princess of England, ELIZABETH!" And then the trumpets blew; then the childe was brought up to the altar and the Gospell said over it. After that, immediately the Archbyshop of Canterburie confirmed it, the Marchionesse of Excester being god-mother: then the Byshop of Canterburie gave unto the Princesse a standing cup of golde; the Dutchesse of Norfolke gave to her a standing cup of golde fretted with pearle; the Marchionesse of Dorset gave three gilt boles pounced with a cover; and the Marchionesse of Excester gave three standing boles graven all gilt with a cover. Then was brought in wafers, confects, and ipocrasse, in such plentie, that every man had as much as hee coulde desire: then they set forwarde, the trumpets afore going in the same order towards the Kinges pallace, as they did when they came thitherwarde, &c.

The mayor and aldermen received the King's thanks in his chamber through the dukes of Suffolk and Norfolk; "and from thence they were had to the seller, and dranke, and so went to their barge."

Elizabeth was not three years old when her mother was beheaded. It was on the 19th of May, 1536, that Queen Anne Boleyn was executed on the green before the Tower of London; the marriage of Henry the Eighth with Jane Seymour taking place on the next day. Very soon after the birth of Elizabeth, an Act of Parliament had been passed, declaring that if her mother should die, without leaving any male issue, the crown should descend, on the death of the king, to her and her heirs; thus the princess was placed in the order of succession, not only before the Princess Mary, the daughter of the degraded Queen Catharine, but likewise before even any male issue of the king by a future queen. This arrangement was speedily disturbed upon the death of Queen Anne Boleyn; an act being passed soon after the king's marriage with Jane Seymour, annulling his second marriage as well as his first, and consequently rendering the Princess Elizabeth, as well as the Princess Mary, incapable of succeeding to the crown, which it settled upon Henry's issue by Queen Jane or by any future wife whom he might marry.

After the execution of her ill-fated mother, the young Princess Elizabeth seems to have been greatly neglected by her father. Some very curious information concerning the condition to which she was then reduced, and the "ill case," to use Strype's expression, in which she was left, has been handed down to us in a letter printed by Sir Henry Ellis, in his second series of *Original Letters*. It is addressed by Lady Brian, the governess of the Lady Elizabeth, to Lord Cromwell, from Hunsdon, for instructions concerning her after the death of Queen Anne, her mother. After some preliminary remarks, the Lady Governess thus proceeds:—

My Lord, when my Lady Marys Grace was born, et pleased the King's Grace to appoint me Lady Mastres; and made me a Barones. And so I have been our . . . . . to the Cheldern hes Grace have had sens.

Now et es so my Lady Elizabethe is put from that degre she was afore: and what degree she is at now I know not bot be heryng say; therefor I know not how to order her nor my self, nor none of hers that I have the rewl of: that is her women and har gromes: besychyng yow to be good Lord to my Lady and to al hers: And that she may have som rayment; for she hath neither gown, nor kertel, nor petecot, nor no manner of linnin for smokes, nor cerchefes, nor sleves, nor rayls, nor body-stychets, nor handcerchers, nor mofelers, nor begens. All thys har Graces Mostake, I have dreven of as long as I can, that be my trothe I cannot drive it no longer, besechyng yow, my Lord, that ye wel see that her Grace may have that is nedful for har, as my Trost es ye wel do. Beseeching yow, my owen good Lord, that I may know from yow be conting how I shal order my self; and what es the kyng's Graces pleser and yours, that I shal do in every thing. And whatsom ever it shall ples the kyng's Grace or your Ludship to command me at all teyms, I shal folfel et, to the best of my power.

There appears to have been some misunderstanding between the Lady Governess and one Mr. Shelton, who was chief of the house at Hunsdon. Lady Brian seems to press very strongly for the interference of Lord Cromwell.

My Lord, Mr. Shelton saythe he es Master of thys Hows; what fashion that shal be I cannot tel: for I have not sen et afor. My Lord, ye be so honourable your self, and every man reportethe your Lordsychep lovethe honour that I trust your Lordship will se thys Hows honerabely ordered, how som ever it hath been aforetime, and ef et plese yow, that I may know what your Order is, and if it be not performed, I shal sertify to your Lordship of it. For I fear me it wil be hardly inow performed, for ef the head of . . . . . knew what honour meaneth, et wel be the beter ordered: ef not it will be hard to bring it to pass.

The next paragraph of the letter displays strongly the anxiety of the "discreet lady Governess," as Strype calls her, for the health of her charge, and the extreme imprudence of Master Shelton in meddling with matters which did not concern him.

My Lord, Master Shelton wold have my Lady Elizabeth to dine and sup every day at the bord of Astat [board of estate.] Alas! my Lord, it is not meet for a child of har ag [her age], to kepe such rewl yet. I promes you, my Lord, I dare not take et upon me to kepe har Grace in helthe and she keep that rule: for ther she shal se dyvers mets and freuts, and wine: which would be hard for me to refryn her Grace from et. Ye know, my Lord, there is no place of corekcyon ther. And she es yet to young to correct greatly. I know wel, and she be ther I shal nother bryng her up to the king's graces honour nor hers; nor to har helthe nor my pore honesty. Wherfore I shew your Lordship this my descharg, besycheyng you, my Lord, that my Lady may have a mess of met to har owen logyng, with a good dish or two that is meet for her Grace to et of: and the reversion of the mess shal satisfy al her wemen, a gentleman usher and a groom. Which been eleven persons on her side. Suer I am et wil be (in to right little) as great profit to the king's Grace this way as the t'other way. For if al this should be set abroad, they must have three or four mess of meat, where this one mess shal suffice them al with bread and drink, according as my Lady Maries Grace had afore; and to be ordered in al things, as her Grace was afore.

The description which is contained in this letter of the manners and disposition of the young princess at so early an age, is assuredly not the least interesting part of it.

God knoweth (says the governess) my Lady hath great pain with her great teeth, and they come very slowly forth: and causeth me to suffer her Grace to have her wil more than I would; I trust to God and her teeth were wel graft, to have her Grace after another fashion than she is yet: so as I trust the King's Grace shal have great comfort in her Grace. For she is as toward a child, and as gentle of conditions as ever I knew one in my leyf. Jesu preserve her Grace. As for a day or two at a hey teym or whan som ever it shal please the King's Grace to have her set abrod, I trost so to indever me, that shee shal so do as shal be to the King's honeur and hers: and then after to take her ease again.

The letter then concludes thus:—

I think master Shelton wil not be content with this. He

* Dr. John Stokesley, who held the see from 1530 to 1540.

† Dr. Thomas Cranmer, who was primate from 1532 till 1553, and in 1556 suffered at the stake under Mary.

may not know it is my desier; but that et es the Kyng's plesure, and yours it should be so. Good my Lord, have my Lady's Grace, and us that be her poor servants, in your rememberance. And your Lordship shal have our harty prayers by the Grace of Jesu: ho ever preserve your Lordship with long life, and as myche honer as your nobel hart can desire. From Hunsdon with the evil hand of har that is your daily bead-woman

MARGET BRYAN.

The superscription is "To the ryght nobel and my syngeler good Lord my Lord Prive Sel, be thys delyverd."

Of the manner in which the Princess Elizabeth was brought up during the remainder of her father's reign, we have scarcely any information. There is extant a record of that period, which furnishes an interesting memorial of her skill and industry at a very early age. It is to be found among the Cottonian Manuscripts, in a list of New Year's Gifts to Prince Edward, in the 30th of Henry VIII. (1539.) The king and his nobles gave principally plate. The Lady Mary's Grace gave a coat of crimson satten, embroidered with gold, with paunses of pearls, and sleeves of tinsel, and four aglets of gold. The LADY ELIZABETH'S GRACE gave "a shyrte of Cam'yke, of HER OWNE WOORKYNGE." She was then only in her sixth year.

Queen Catharine Parr, the last and most fortunate of Henry's queens, is said to have paid considerable attention to the education of both the young princesses Mary and Elizabeth. Their position was greatly bettered by the act which was passed for the settlement of the Crown, soon after her marriage with the king in 1544, and by which they were both declared capable of succeeding to the throne on certain conditions, after the failure of the king's male issue.

Our engraving represents the ancient palace of Placentia at Greenwich, in which Elizabeth was born. Grenewic or Grenevic, as this place was called by the Saxons, is literally the green village, meaning perhaps, as Lysons suggests, the village on the green. We have traces of a royal residence at this place, as early as the year 1300, when Edward I. made an offering of seven shillings at each of the holy crosses in the chapel of the Virgin Mary, and the Prince made an offering of half that sum. Henry IV. dates his will in 1408, from his manor of Greenwich. Henry V. granted this manor for life to Thomas Beaufort, Duke of Exeter, who died at Greenwich in 1426. It was soon afterwards granted by Henry VI. to his uncle Humphrey, Duke of Gloucester, (the youngest son of Henry IV.) who, in 1433, had the royal licence to fortify and embattle his manor-house, and to make a park of two hundred acres. Soon after this, the duke rebuilt the palace, calling it *Placentia*, or the Manor of Pleasaunce; he enclosed the park also, and erected within it a tower on the spot where the Observatory now stands. Upon the Duke of Gloucester's death, which happened in 1447, this manor reverted to the Crown. Edward IV. took great pleasure in finishing and enlarging the palace; and for that purpose, expended a considerable sum. In 1466, he granted the manor with the palace and park, to his queen, Elizabeth, for life. In his reign, the marriage of his youthful son Richard, Duke of York, (afterwards murdered with his brother, Edward V., in the Tower,) with Anne Mowbray, daughter and sole heir of the Duke of Norfolk, was solemnized at Greenwich with great splendour. Henry VII. resided much at this palace; his second son, Prince Henry, (afterwards Henry VIII.,) and his third son, Edmund Tudor, created Duke of Somerset, were born there. Lambarde, the author of the *Perambulation of Kent*, says that this monarch beautified the palace by the addition of a brick front towards the water side; and Stow mentions his repairing the palace in 1501.

Henry the Eighth was born at Greenwich, on the 28th of June, 1491, and was baptized in the parish church by Richard Fox, Bishop of Exeter, Lord Privy Seal; the Earl of Oxford, and Peter Courteney, Bishop of Winchester, being his godfathers. This monarch, from partiality, perhaps, to the place of his birth, neglected Eltham, which had been the favourite residence of his ancestors, and bestowed great cost upon Greenwich, till he made it, as Lambarde says, "a pleasant, perfect, and princely palaice." During his reign it became one of the principal scenes of that festivity for which his court was celebrated. His marriage with his first queen, Catharine of Arragon was solemnized at Greenwich on the 3rd of June, 1509. On May-day, and the following two days, in the year 1511, tournaments were held there; the king himself, Sir Edward Howard, Charles Brandon, and Edward Neville, challenging all comers. In 1512, the king kept his Christmas at Greenwich, "with great and plentiful cheer;" and again in 1513, "with great solemnity, dancing, disguisings, and mummers in a most princely manner," among which was introduced the first masquerade ever seen in England.

On the 13th of May, 1515, the marriage of Mary queen dowager of France, (Henry's sister) with Charles Brandon, Duke of Suffolk, was solemnized publicly at Greenwich. Tournaments were held there in 1517, 1526, and 1536; the king kept his Christmas there in 1521, "with great nobleness and open court," and again in 1525. In 1527 he received the French embassy at this place; and the same year kept his Christmas here "with revels, masks, disguisings, and banquets royal;" as he again did in 1533, in 1537, and in 1543. In the last-mentioned year he entertained twenty-one of the Scottish nobility whom he had taken prisoners at Solway Moss, and gave them their liberty without ransom. Edward the Sixth kept his Christmas at Greenwich, in 1552, George Ferrers, Esq., of Lincoln's Inn, being "Lorde of the merrie disporte." It has been reasonably supposed that the festivities in which he indulged on this occasion, and which were of a character wholly unsuited to his age and constitution, contributed to bring about his death shortly afterwards*; he died at Greenwich Palace on the 6th of July following.

Queen Mary was born at Greenwich, in February, 1516; and baptized there a few days after her birth, Cardinal Wolsey being her godfather, and the Lady Catharine and the Duchess of Norfolk her godmothers. Of Elizabeth's birth at this palace, and of the solemnities which accompanied her christening, we have before spoken. When she ascended the throne, Greenwich became her favourite Summer residence; she also visited it occasionally at other seasons of the year. Of the manner in which she kept her court there, and of other particulars concerning this spot, we shall speak hereafter.

No part of the Palace represented in our engraving is now standing. Charles the Second pulled it all down, it having become much decayed; he intended to raise a nobler structure on the same spot, but succeeded in erecting only one wing, which forms that part of the present Hospital, commonly called King Charles's Building.

* "Their dangerous excitement, their fatiguing joyousness, their late hours and table indulgences, were immediately followed by a consumptive cough, so alarming and exhausting, that the lord of misrule and his merry tumults may be more justly supposed to have produced the fatal change in the king's ever-delicate health, than either grief for his lost uncles, or poison from Northumberland in that 'nosegay of sweet flowers which was presented to him as a great dainty on new year's day.'"——SHARON TURNER

THE LIFE-BOAT,

AND THE MEANS OF SAVING THE LIVES OF SHIPWRECKED MARINERS.

THE LIFE-BOAT.

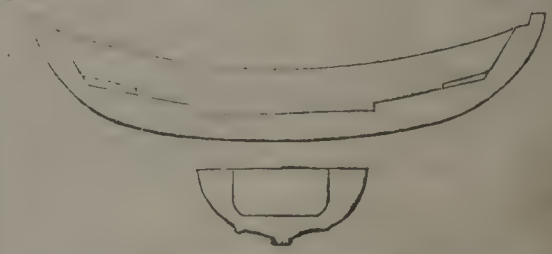
We may refer with pride, as well as pleasure, to the almost innumerable contrivances and plans, which have from time to time been proposed by ingenious and scientific persons of our own country, for the purpose of preserving life in cases of danger, whether from shipwreck, fire, or other sudden calamity; in the present paper we shall notice a few of the principal means employed to save the lives of shipwrecked mariners. On account of the exhausted state of the poor creatures on board a wreck, it is natural to look for the greatest amount of assistance from persons on shore, and accordingly we find that, although many lives have been saved by the exertions of the crew themselves, much larger numbers owe their preservation to the perilous exertions of adventurous men on the coast.

The Life-boat of Mr. Greathead, of South Shields, has been the most successful of these inventions. A model of this boat was sent to the Society of Arts, and in 1802 this Society presented the inventor with their gold medal and fifty guineas. So highly was it appreciated by government, that a reward of 1200*l.* was subsequently voted by Parliament, besides other rewards by the Trinity House and Committee of Lloyd's; this latter institution devoted also 2000*l.* to the purpose of building boats on Mr. Greathead's plan. Since this time most of the dangerous parts of our coasts have been furnished with life-boats on the same construction.

The length of the life-boat is thirty feet, the breadth ten feet, the depth, from the top of the gunwale to the bottom of the keel in midships, three feet three; but from the gunwale to the platform, or boarding within, it is but two feet four inches. The form of this boat is very different to that of those in common use, and from its construction it is impossible it can upset. It is said that its peculiar figure was suggested by the properties possessed by the sections of an oblate spheroid, a globular figure, flattened on two of its opposite sides, a form exactly resembling that of an orange. Indeed the figure and power of this boat may be popularly illustrated by means of a simple operation upon this fruit. Take an orange, and divide the skin by two circular incisions, as in the annexed figure; this will divide the rind into four portions, each a miniature life-boat, when separated carefully from the fruit. If either of these pieces are thrown into a vessel of water, it will be seen that, although by overloading it may be sunk, it never can be overturned by any weight placed within it. Its shape then giving the boat this property, to guard against its sinking, the sides, from the under part of the gunwale along the whole length of the regular shear, extending twenty-one feet six inches, are cased with layers of cork, to the depth of sixteen inches downwards, the thickness of this casing being four inches.

The boat being of the same form at both ends, can be rowed in either direction; the rowing oars are short; but those employed for steering, for there is no rudder, are one-third longer.

The cork weighs nearly seven hundred weight, and from this it may be well understood, what an immense accession of buoyancy is gained; so light is she, and so well formed, that even when full of water she is rowed with ease, and obeys the helm with the greatest quickness.



Second in importance to the Life-boat alone, in the humane cause of saving life from shipwrecks, are the ingenious inventions of the veteran philanthropist, Captain Manby. This worthy gentleman has devoted a considerable portion of his long and active life to devising and perfecting the means of forming a communication between the crew of a vessel in danger and the persons on shore, by conveying a rope from the shore to the ship, or from the ship to the shore. This Captain Manby accomplishes by affixing a shot to a rope, discharging it

from a gun, a mortar, or some other piece of ordnance, so that the rope should become entangled with the rigging of the ship, and thus lay the foundation for a more secure communication. His first object was to coil the rope in such a manner, that, in uncoiling, there shall be no danger of entanglement, as a very slight hitch would alter the direction of the shot, or, perhaps, break the rope.

The following method, fig. 1, is recommended as one of the best, particularly on account of its allowing the eye to run rapidly over the coils, for the purpose of ascertaining whether it has been disturbed by the storm. The rope is arranged in what

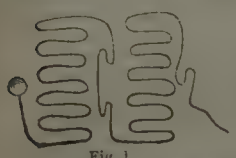


Fig. 1.

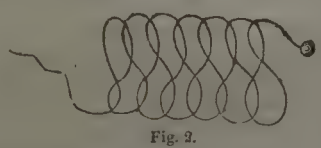


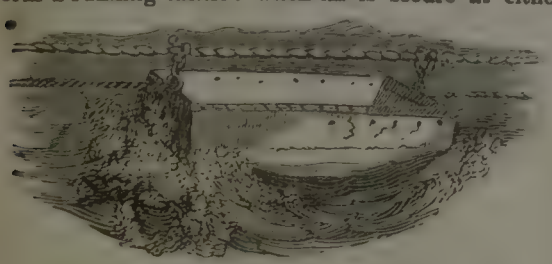
Fig. 2.

what are called French *fakes*, or tiers. Other methods are also resorted to, as a *whale-laid* coil, or a chain-fake, fig. 2. But as all these methods require time and care, they are likely to fail in the hurry of the moment, and a rope kept ready coiled in a basket, so that it could be carried on the back of a man like a knapsack, is considered the most certain. The difficulty of fixing the shot so that the flame of the gunpowder might not burn its attachment to the rope, was next to be overcome, and it was found that a thong of stout platted hide, woven extremely close, was capable of most resistance, being, at the same time, not easily inflamed and very elastic, for chains of every description were snapped in two by the sudden jerk.

The shot employed was of two sorts, round shot

with a loop, to which to affix the platted hide, and barbed shot; the advantage of this last is, that it

more readily entangles itself with the rigging. If the rope has reached its destination, one much stronger is fixed to it by the people on shore; to this thicker rope a block is fixed, through which a smaller rope is rove, the two ends being left on shore so as to form a running tackle: when all is secure at either



LIFE-PRESERVING COT.

end, a cot, a kind of cradle, which is part of the life-preserving apparatus, is slung upon the thick rope, the two ends of the smaller rope being fastened to each extremity of the cot, so that it may be hauled on board the ship and back again to shore: this cot is intended more particularly for women and children, and is furnished with lashings all round, while the bottom is made of strong netting to allow the water to run out.

In order to render the passage of the shot visible at night, a shell instead of a shot is fixed to the rope; this shell has four holes, in which are fixed

as many fuzes. The shell itself being filled with the most brilliant combustible composition, its effect when passing through the air, is surprisingly bright.

THE ATMOSPHERE.

The Atmosphere is an element which we cannot see, but which we feel investing us wherever we go; whose density we can measure to a certain height; whose purity is essential to existence; whose elastic pressure on the lungs, and on and around the frame, preserves man in that noble attitude which lifts his head towards the skies, and bids him seek there for an eternal home. The atmosphere is neither an evaporation from earth nor sea, but a separate element bound to the globe, and perpetually accompanying it in its motions round the sun. Can we for an instant imagine that we are indebted for the atmosphere only to some fortuitous accident? If there were no atmosphere, and if we could possibly exist without one, we should be unable to hear the sound of the most powerful artillery, even though it were discharged at the distance of a single pace. We should be deprived of the music of the sea, the minstrelsy of the woods, of all the artificial combinations of sweet sounds, and of the facinating tones of the human voice itself. We might make our wants and our feelings perceptible to each other, by signs and gesticulations, but the tongue would be condemned to irremediable silence. The deliberations of assemblies of men, from which laws and the order of society, have emanated, could never have taken place. The tribes of mankind would wander over the earth in savage groups, incapable of civilization, and the only arts which they could ever know, would be those alone that might enable them to destroy each other.——*Quarterly Review.*

There are habits, not only of drinking, swearing, and lying, and of some other things, which are commonly acknowledged to be habits, and called so, but of every modification of action, speech, and thought; man is a bundle of habits. There are habits of industry, attention, vigilance, advertency; of a prompt obedience to the judgement occurring, or of yielding to the first impulse of passion; of extending our views to the future, or of resting upon the present; of apprehending, methodizing, reasoning; of indolence, dilatoriness, of vanity, self-conceit, melancholy, partiality; of fretfulness, suspicion, captiousness, censoriousness; of pride, ambition, covetousness; of overreaching, intriguing, projecting; in a word, there is not a quality of function, either of body or mind, which does not feel the influence of this great law of animated nature.——Paley.

EASY LESSONS ON CHRISTIAN EVIDENCES.

No. XIII.

MODERN JEWS.

ONE of the difficulties with which the minds of some Christians are perplexed, is, that Jesus Christ should have been rejected by the greater part of his countrymen, the Jews; and that they who had been, according to our Scriptures, for so many ages, God's favoured and peculiar People, should be now, and for above seventeen centuries, without a country, and scattered as outcast strangers through the world.

Their present condition and past history are indeed something very extraordinary, and quite unlike what has befallen any other nation. But though we may not be able to explain all the circumstances relative to this wonderful people, it will be found on reflection that they furnish one of the strongest evidences for the truth of the very religion which they reject.

You know that when the Jews received the law through Moses, they were promised success and prosperity as long as they should obey the Lord; and that heavy judgments were denounced against them in case of disobedience. It was foretold that they should be defeated by their enemies, driven from their country, scattered abroad, and continually harassed and oppressed. These threats are set forth in various parts of the books of Moses, and most particularly in the twenty-eighth chapter of Deuteronomy. "Thou shalt become an astonishment, a proverb, and a by-word among all the nations whither the Lord shall lead thee. The Lord will make thy plagues wonderful, and the plagues of thy seed, even great plagues of long continuance. And the Lord shall scatter thee among all people, from the one end of the earth even unto the other."—v. 37, 59, 64.

And the same is to be found in various parts of the writings of several of the prophets, who lived some ages after. In particular, there is one in Ezekiel, which agrees most remarkably in one very curious particular, with the state of the Jews at this day; namely, where he declares that they should, in the midst of their sufferings, remain a distinct people, unmixed with, and unlike other nations; although it appears that in his time, they were very much disposed to unite themselves with the rest of mankind, so as to become one of the Gentile nations, and to lay aside all the distinctions of their own race. "That which cometh into your mind shall not be at all, that ye say, We will be as the heathen, as the families of the countries, to serve wood and stone." (Ezekiel xx. 32.)

Now we find in the Old Testament, that, in several instances, these judgments did fall on the Jews; and especially when they were carried away captive to Babylon. And some persons may suppose that these instances were all that Moses and the prophets had in view. But whatever any one's *opinion* may be, it is a *fact*, of which there can be no doubt, that the Jewish nation are actually suffering, at this day, such things as Moses and the prophets predicted. Whether Moses and Ezekiel had in view what is now taking place, or not, may be a matter of opinion; but it is a matter of fact, that what is now taking place, does agree with their predictions. Jerusalem and its Temple were taken and burnt by the Romans, about forty years after the crucifixion of Jesus Christ. The Jews were driven from their country, and never allowed to settle in it again. Hundreds of thousands were sold as slaves; and the whole people were cast forth as wanderers among the Gentiles; and they have ever since remained a nation of exiles, unsettled, harassed and oppressed in many instances most cruelly, not only by Pagans and Mohammedans, but also (to our shame be it spoken,) by Christian nations; and still remaining a distinct people, though without a home.

One of the most remarkable points relative to these predictions respecting the Jews, and their present condition, is this; that the judgments spoken of by Moses, were threatened in case of their departing from the law which he delivered, and especially, in case of their worshipping false gods; and yet, though in former times they were so apt to fall into idolatry, they have always, since the destruction of Jerusalem, steadily kept clear of that sin; and have professed to be most scrupulous observers of the law of Moses. And what is more, all the indignities and persecutions that any of them are exposed to, appear to be the *consequence* of their keeping to their religion, and not of their forsaking it. For a Jew has only to give up his religion, and conform to that of the country he lives in, whether Christian, Mohammedan, or Pagan, and lay aside the observances of the law of Moses, and he immediately ceases to be reproached as a Jew, and an alien, and is mingled with the people around him. So that the Jews of the present day seem to be suffering for their observance of the law, just the penalties threatened for their departure from it.

At first sight this seems very hard to explain; but, on reflection, you will find the difficulty cleared up, in such a way as to afford a strong confirmation of your faith. First, you should observe, that the Jews themselves admit that a Christ or Messiah was promised them; and that to reject Him on his coming would be an act of rebellion against the Lord their God. Moses foretold that the Lord should raise up from among them a Prophet like Moses himself; and "whosoever should not hear that Prophet," God "would require it of him;" and "that he should be destroyed from among the people."—(Deut. xviii. 15—19; Acts iii. 22, 23.) This is generally understood (as it is applied in the Acts,) to relate to the Messiah, or Christ; whom the other prophetical writers of the Old Testament (as both Jews and Christians are agreed,) more particularly foretold and described. Now *we* hold that the Jews have been guilty of this very act of disobedience, in rejecting the Christ. And though they, of course, do not confess themselves thus guilty, because they deny that Jesus of Nazareth was the true Christ, yet they so far agree with us as to acknowledge that the rejecting of the true Christ on his coming would be such a sin as would expose them to the judgments which Moses threatened.

To us, therefore, who do believe in Jesus, this affords an explanation of their suffering these judgments.

But, secondly, besides this, you will perceive on looking more closely, that the Jews of these days do *not* really observe the law of Moses, though they profess and intend to do so. They have, indeed, kept to the *faith* of their forefathers; but not to their religious *observances*. For, the chief part of the Jewish worship consisted in offering sacrifices distinctly appointed by the Lord Himself, in the law delivered by Moses. There was a sacrifice appointed to be offered up every day, and two on the Sabbath; besides several other sacrifices on particular occasions. Now, the modern Jews, though they abstain from certain meats forbidden in their law, and observe strictly the Sabbath and several other ordinances, yet do not offer any sacrifices at all; though sacrifices were appointed as the chief part of their worship.

The reason of this is, that they were strictly forbidden to offer sacrifices except in the *one place* which should be appointed by the Lord for that pur-

pose. And the place last fixed on for these offerings having been the Temple at Jerusalem, which was destroyed about seventeen hundred years ago, and has never been restored, the Jews are now left without any place in which they can lawfully offer the sacrifices which their law enjoins.

The Jews, accordingly, of the present day, plead that it is not from wilful disobedience that they neglect these ordinances, but because they cannot help it. But to say that it is not their own fault that they do *not* observe the ordinances of their religion, is quite a different thing from saying that they do observe them. They may explain *why* they cannot keep the law of Moses; but they cannot say that they do keep it.

Now Christians hold that the ceremonies of that law were not originally designed to be observed by all nations, and for ever; that "the law had only a shadow of good things to come," (Heb. x. 1,) that is, of the Gospel; and that it was designed that the sacrificing of lambs and bullocks should cease at the coming of the Christ. A Jew, on the contrary, will not allow that these were designed ever to cease: but he cannot deny that they *have* ceased, and that, for above seventeen centuries. Let a Jew explain if he can, how it is, that, for so long a time, Providence has put it out of the power of the Jews to observe the principal part of their religion which they maintain was intended to be observed for ever.

And this is also very remarkable; that the religion of the Jews is almost the only one that *could* have been abolished *against the will* of the people themselves, and while they resolve firmly to maintain it; *their* religion, and theirs only, could be, and has been, thus abolished in spite of their firm attachment to it, on account of its being dependent on a particular place,—the Temple at Jerusalem. The Christian religion, or again, any of the Pagan religions, could not be abolished by any force of enemies, if the persons professing the religion were sincere and resolute in keeping to it. To destroy a Christian place of worship, or to turn it into a Mohammedan mosque, (as was done in many instances by the Turks,) would not prevent the exercise of the Christian religion. And even if Christianity were forbidden by law, and Christians persecuted, (as has in times past been actually done,) still if they were sincere and resolute, they might assemble secretly in woods or caves; or they might fly to foreign countries to worship God according to their own faith; and Christianity, though it might be driven out of one country, would still exist in others.

And the same may be said of the Pagan religions. If it happened that any temple of Jupiter, or Diana, or Woden, were destroyed, this would not hinder the worshippers of those gods from continuing to worship them as before, and from offering sacrifices to them elsewhere.

But it was not so with the Jews. Their religion was so framed as to make the observance of its ordinances impossible, when their Temple was finally destroyed. It seems to have been designed and contrived by Divine Providence, that as their *law* was to be brought to an end by the Gospel, (for which it was a preparation,) so, all men were to *perceive* that it did come to an end, notwithstanding the obstinate rejection of the Gospel by the greater part of the Jews. It was not left to be a question and a matter of *opinion*, whether the sacrifices instituted by Moses were to be continued or not; but things were so ordered, as to put it out of Man's power to continue them.

THE EEL.

Although the Eel is a fish with which we are so familiar, and one which comes so frequently under the notice of most people, until of late years very little was known of its habits and general economy. Mr. Yarrell has thrown much additional light on the history of the Eel tribe; and in the following account we have borrowed largely from his splendid work on *British Fishes*. According to this naturalist, there are three well-ascertained species of fresh-water Eels, to which he has given the following names,—the Sharp-nosed Eel, (*Anguilla acutirostris*); the Broad-nosed Eel, (*Anguilla latirostris*); and the Snig, (*Anguilla medirostris*); the Grig is also considered a separate species by Baron Cuvier. In addition to this there is the Conger Eel, which inhabits the coasts of the sea.

The form of the Eel, resembling that of the serpent, has long excited a prejudice against it, which exists in some countries even to the present time: and its similarity to snakes has even been repeated by those, who, from the advantages of education, and their acquirements in natural history, might have been supposed capable of drawing more accurate conclusions. There is but little similarity in the snake and the Eel, except in the external form of the body; the important internal organs of the two animals, and the character of the skeleton, are most decidedly different.

Eels are, in reality, a valuable description of fish; their flesh is excellent as food; they are very numerous, very prolific, and are found in almost every part of the world. The various species are hardy, tenacious of life, and very easily preserved. In this country they inhabit almost all our rivers, lakes, and ponds; they are in great esteem for the table, and the consumption in our large cities is very considerable. The London market is principally supplied from Holland, by Dutch fishermen. There are two companies in Holland, having five vessels each; their vessels are built with a capacious well, in which large quantities of Eels are preserved alive till wanted. One or more of these vessels may be constantly seen lying off Billingsgate; the others go to Holland for fresh supplies, each bringing a cargo of 15,000 to 20,000 pounds' weight of live Eels, for which the Dutch merchant pays a duty of £13 a cargo for his permission to sell. Eels and salmon are the only fish sold by the pound weight in the London market.

Eels are not only numerous, but in great request in many other countries. Ellis, in his *Polynesian Researches*, says,—

In Otaheite, Eels are great favourites, and are tamed and fed until they attain an enormous size. The pets are kept in large holes two or three feet deep, partially filled with water. On the sides of these pits they generally remained, excepting when called by the person who fed them. I have been several times with the young chief, when he has sat down by the side of the hole, and, by giving a shrill sort of whistle, has brought out an enormous Eel, which has moved about the surface of the water, and eaten with confidence out of his master's hand.

The habits of Eels induce them to make two migrations in the course of the year, one in Autumn, to the sea, and the other in Spring, or the beginning of Summer, from the sea. The Autumn migration is performed by the adult Eels, and is supposed to be for the purpose of depositing their spawn; and it is said that these fish never return up the river: the Spring migration is supposed to consist entirely of young Eels. Mr. Yarrell is inclined to think there is an error in the belief that the old Eels do not return.

The passage of countless hundreds of young Eels has been seen and described as occurring in the Thames, the Severn, the Parrett, the Dee, and the Ban. I am, however, of opinion, that the passage of adult Eels to the sea, or rather to the brackish water of the estuary, is an exercise of choice, and not a matter of necessity; and that the parent Eels return up the river with the young fry.

All authors agree that Eels are extremely averse to cold. There are no Eels in the Arctic Regions, none in the rivers of Siberia, the Wolga, the Danube, or any of its tributary

streams. There is no doubt that fishes in general, and Eels in particular, are able to appreciate even minute alterations in the temperature of the water they inhabit. The mixed water they seek to remain in during the colder months of the year, is of a higher temperature than the pure fresh-water of the river, or that of the sea. It is a well known law in chemistry, that when two fluids of different densities come in contact, the temperature of the mixture is elevated for a time in proportion to the difference in the density of the two fluids. Such a mixture is constantly taking place at the mouths of rivers that run into the sea, and the mixed waters maintain a temperature two degrees warmer than that of the river or the sea. This elevation in the temperature of the water of estuaries and the mouths of rivers, is, I have no doubt, one reason why they in general abound with young fish.

During the Winter, the Eels remain imbedded in the mud twelve or sixteen inches deep, by the side of the channel of the stream they frequent.

Great doubt has existed as to whether the Eel produces its young alive, or deposits its spawn in the same manner as other fishes; but the observations of Mr. Yarrell and others, have gone far to prove that Nature does not step out of her regular course in the case of the Eel; that is, that the Eel produces its young in the same way as the rest of the class of fishes. Singular notions were entertained on this subject by the ancients and by some of the moderns. Aristotle believed they sprung from the mud; Pliny, from fragments which were separated from their bodies by rubbing against the rocks. Helmont believed they came from May-dew, and might be obtained by the following process.

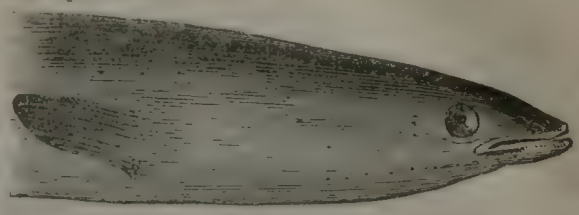
Cut up two turfs covered with May-dew, and lay one upon the other, the grassy sides inwards, and thus expose them to the heat of the sun; in a few hours there will spring from them an infinite quantity of Eels.

The reason why Eels have been considered *viviparous*, has arisen probably, from their being infested with numerous intestinal worms, which have been mistaken for young Eels. The sudden appearance of Eels in places where they were known not to have existed previously, has added a little to the mystery of their mode of production. But there are many well-authenticated accounts of the manner in which this is most likely effected. The Eel in warm and moist nights, has been known to quit the water and travel a considerable distance through the wet grass. One instance of this occurs in Dr. HASTING'S *Natural History of Worcestershire.*

I will here mention a curious confirmation of the opinion in favour of the overland migration of Eels. A relative of the late Mr. Perrot was out in his park with his keeper, near a large piece of water, on a very beautiful evening, when the keeper drew his attention to a fine Eel quietly ascending the bank of the pool, and with an undulating motion making its way through the long grass; on further observation, he perceived a considerable number of Eels quietly proceeding to a range of stews, nearly at the distance of a quarter of a mile from the large piece of water from whence they started. The stews were supplied by a rapid brook, and in all probability, the instinct of the fish led them in that direction, as a means of finding their way to some large river from whence their ultimate destination, the sea, might be obtained.

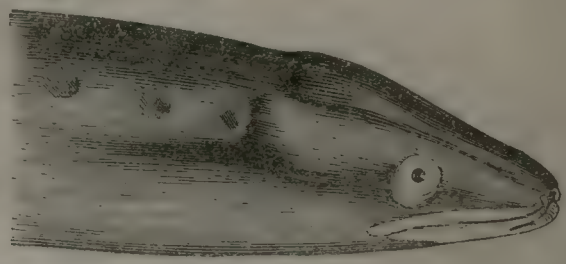
There is no doubt, however, that Eels will breed in fresh-water ponds which have no communication with the sea or river.

The Sharp-nosed Eel is that most commonly met with in the markets; as its name implies, the snout is much more pointed than that of the other species; the head is flattened on the sides, and the eye is placed immediately over the angle of the mouth. In streams of pure water the belly of this Eel is clear and bright; it is then called a Silver Eel. This Eel is found of a larger size than either of the other species; at Cambridge, the skins of two are preserved which weighed together fifty pounds; the heaviest weighing twenty-seven pounds, the second twenty-three pounds.



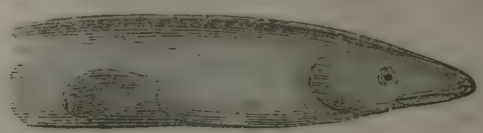
THE SHARP-NOSED EEL.

The Broad-nosed Eel is distinguished from the last by its broad head, flattened on the summit; the eye is placed rather in advance of the angle of the mouth.



THE BROAD-NOSED EEL.

This is the Grig, or Glut, Eel, of Pennant, who says "they have a larger head, blunter nose, and thicker skin than the common sort." The term grig is applied near London to the small-sized Eel, whose



THE GRIG EEL.

head is shown in the engraving; but the fishermen in the London river, call all small Eels which do not exceed eight or nine inches in length, Grigs.

The fourth species of Eel frequenting fresh water, is the Snig. This seems to be very rare, Mr. Yarrell

THE SNIG EEL.

having only seen two specimens, both of which were taken from the Avon, in Hampshire, where it is considered distinct from the common and well-known Eels.

IRRESOLUTION.—In matters of great concern, and which must be done, there is no surer argument of a weak mind than irresolution; to be undetermined where the case is so plain, and the necessity so urgent. To be always intending to live a new life, but never to find time to set about it; this is as if a man should put off eating, and drinking, and sleeping, from one day and night to another, till he is starved and destroyed.—TILLOTSON.

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THE CASTLE OF HEIDELBERG. No. II.

EAST VIEW OF HEIDELBERG CASTLE, FROM A DRAWING MADE IN 1619.

THE Regent dying in 1572, was succeeded by his nephew Frederic the Fourth, who added much to his residence, and one of the finest and most perfect portions, built in a style of florid architecture, corresponding with the erections of Otho Henry, and embellished with the most gorgeous statues of the electors, remains a monument of his taste. This structure, which forms the south side of the great Tournament Court, was devoted to the purpose of a chapel, with a fine ball-room above, and still bears the name of *Friederich's Bau*, or Frederic's Building. The magnificent stone balcony overlooking the town was also the work of this period: here all travellers are taken to see an indentation somewhat resembling the impress of a human foot, in one of the flag-stones; concerning which, the legend goes, that a young princess who, in her ardour to join her lover, leaped from a three-story-high window above, and being, we conclude, more nimble than the gentleman was dexterous, descended with such violence, as to imprint the shape of her foot in the solid pavement. The thousands of curious feet, great and small, which have since measured their length in this place, have maintained its shape, and swelled it to colossal dimensions. Whether the lady gave rise to the story of the stone, or *vice versâ*, we leave our readers to decide; we tell the tale as it was told to us.

But to return to Frederic the Fourth. In the University library, part of a journal kept by this Pfalzgraf between the years 1596 and 1599, is still preserved. As far as regards the eating, drinking, and hunting routine of the day, it doubtless is a faithful, and, therefore, interesting picture; but we obtain from it no information, either local or historical, concerning the Castle. Dying in 1610, he was succeeded by his son Frederic the Fifth, subsequently king of Bohemia, who, from his alliance with Elizabeth, daughter of James the First of England, from his prominent position at the commencement of the thirty years' war, of which his cruel fortunes first fired the fatal spark, and from the train of afflictions, public and domestic, which hunted him to an early grave, has obtained a mournful celebrity in the annals of the Palatinate. With regard to the improvement of the Castle, also, his name and that of his high-minded consort stand equally forward, and though its strength and importance declined with his fortunes, and never entirely rallied again, yet we must not forget that he it was who raised it to that splendour which still lingers over its ruined halls. Animated alike by a natural taste for magnificence, by a highly cultivated mind, and, above all, by the most ardent passion for his English bride, he spared no pains in rendering his Castle worthy her abode. In honour of her, a palace in the Elizabethan style of architecture, and furnished on the model of English comfort, quickly arose, and by the simplicity and lightness of its proportions, remains strikingly distinct from the massive gorgeousness of the surrounding walls. Nothing could surpass the varied attractions of

the gardens, of which an elegant archway, still called Elizabeth's gate, formed, and yet forms, a conspicuous ornament; while De Caux, architect to the king of France, employed in these additions, taxed his invention in the erection of grottoes, obelisks, fountains, &c. Our print of the Castle, is copied from a drawing taken in 1619.

Scarcely were these improvements completed, and the first years of happy royal wedlock flown over, when the election of Frederic to the crown of Bohemia called this interesting couple from their beloved Heidelberg; and, as it subsequently proved, from all permanent happiness and distinction. The dignity of a crown was but short-lived; a few years saw them fugitives and pensioners in a foreign land, while their proud patrimonial castle and lands suffered all the horrors of siege, famine, and spoliage, under the devastating influence of the thirty years' war. Our present royal family of England derives its descent from this same Elizabeth Stuart, Countess Palatine, and queen of Bohemia, through Sophia, the youngest of her numerous and ill-fated family, who became wife to the Elector of Hanover, and mother of George the First.

Frederic the Fifth died in obscurity at Mayence, in 1632, and on the 7th of October, 1649, after a period of unexampled horror and public calamity, Charles Louis, his eldest son, was reinstated in the ruined halls of his fathers. His first acts were to repair the breaches of war and plunder, and although his lands still groaned beneath their effects, he contrived to carry on his plans with solidity and expedition, and, at the same time, to recruit the broken fortunes of the Palatinate. His only daughter, Elizabeth Charlotte, he bestowed in marriage on the Duke of Orleans, and thereby unconsciously laid the foundation of that fearful struggle which once more laid his towns and villages in ashes, and gave the finishing blow to the downfall of Heidelberg Castle. His only son, by his royal consort, Charles Louis, studied, and received a doctor's degree, at the University of Oxford, a ceremony which was followed by the presentation of the order of the Garter from his cousin Charles the Second. Receiving during his sojourn in England, in 1680, tidings of his father's demise, he hastened home and assumed the sovereignty. This prince also busied himself in the work of reparation.

The favourite amusements of this Elector consisted in theatrical and military spectacles, and a curious work still exists of the pageants and ballets performed at the castle. Having over-exerted himself, however, at a mock siege, a tedious illness was induced, which terminated his life. Here the Palatinate line expires, Charles Louis leaving no issue, and henceforward the history of the castle presents only a successive picture of treachery, violence, and final desolation.

Philip William, of the house of Neuburg, was the first to claim and assume the seat of authority at Heidelberg. Two antagonists, however, soon appeared in the lists against him, in the persons of Leopold, Count of Veldenz, and Louis the Fourteenth of France, the alliance of whose brother, the Duke of Orleans, with the late Elector's sister, we have already noticed. The pretensions of Veldenz were quickly satisfied, or compromised; France proved a weightier foe, and not finding the channel of political menace and negotiation successful, deluged the devoted land with a hostile force, and military resistance proving useless, the castle and town capitulated on the 25th of October, 1688, but upon honourable conditions. No sooner, however, were the French in possession, than they began to abuse all authority, and to violate every treaty. The town's-people were maltreated, exorbitant levies exacted, the state-papers purloined, &c. These acts, however, were only introductory to the succeeding ravages, which commenced by the arrival of a company of French miners, who pounced with the weapons of destruction upon the proudest portions of the castle. At the same time, the surrounding suburbs and villages were fired, and, as if they had only waited for this beacon to let loose the demons of carnage and plunder, Heidelberg now became the scene of all the horrors attending a town taken by storm. The approach of a body of German troops seemed only to sharpen every diabolical purpose, the Town-house, the Marstall, and every building of importance, was reduced to ashes—the windows at the Castle were smashed, the ornamental stuccoes knocked to pieces—all the wine that was not poured out in licentious excess carried off to Manheim, and finally, before their evacuation, as if to complete the sum of wanton destruction, the Exchequer-house, the Neckar-bridge, and the so-called splendid Thick-tower were remorselessly blown into fragments. At length, on the 2nd of March, 1689, the invaders left the regions they had converted into a desert, taking with them, however, several persons of distinction as hostages. The castle was then occupied by an imperial and allied garrison, under the command of General Heydersdorf, and some show of reparation commenced. In the mean time, Philip William had retired to Vienna, where he died of apoplexy, in 1690, and was succeeded, or, at least, nominally so, by his son John William. Heidelberg was now little more than a heap of stones; the new Elector, therefore, took up his residence at Düsseldorf, and merely visited the scene of the late struggle to receive the fealty of the surrounding country. But the measure of affliction was not yet full—the vials of destruction not yet emptied over the devoted castle and town. Although stationed in quality of protector to the town's-people, General Heydersdorf scrupled not to extort money, and other supplies from them, and finding his protection but another name for plunder, many families emigrated from the homes which no longer ensured their safety. Happy were they in comparison with those who still clung to the place of their birth!

On the 17th of May, 1692, a body of thirty thousand French troops, with General Melac at their head, marched direct upon Heidelberg, and summoned the town to surrender. On the 20th, fresh forces arriving, General Melac mounted the hills above the castle, took possession of the old ruined fortress, and dispersed his men on the adjacent mountains. Other divisions gathered round the town, cutting fosses and throwing up embankments, to the no small embarrassment of the German commander. Unappalled by these preparations and the strength of their foes, the garrison, composed of a motley group of citizens and soldiers, determined to defend the walls to the last; but, whether paralyzed by fear, or disarmed by a foreign bribe, General Heydersdorf gave such contradictory orders, spiking, for instance, twenty-three of his own cannon, and withdrawing his troops from the most important posts, that it soon became manifest what his intentions were. Indignant at his treachery, the officers under him used every exertion in counteracting his influence, and animating the soldiery; but their enemies had gained too much ground—the suburb was taken, and the occupation of the town soon followed. This time not even the semblance of humanity was shown; and the pillage of the town was granted to five regiments, who too well availed themselves of the barbarous licence. Mingled with grosser acts, every

refinement of cruelty was practised. A crowd of wretched fugitives were forced into the church of the Holy Ghost, and there detained, whilst their persecutors set fire to the roof above them, and taking a demoniacal pleasure in their distress, released them only for fresh torments when the danger threatened to become positive destruction. At length, when scarcely an article was left to plunder, nor a human being to destroy, the whole town was given over to the flames. All that now remained was the castle, which, surrendering in a few days, fared no better than its unfortunate neighbour. The valuable furniture was stolen or destroyed, the graves of the electors broken open, and their bones scattered; at the same time, the chief towers and fortifications, surviving the previous struggle, were undermined and blown up, the Otho Henry's building burnt to the shell it now presents, and in short, every species of destruction adopted which tyranny and brutality could suggest. On the news of the destruction of Heidelberg, and the devastation of the Palatinate, reaching the French capital, Louis the Fourteenth, the pride of modern chivalry, and model of every gallant, ordered a public *Te Deum* in the principal churches, and caused a medal to be struck with the ruins of Heidelberg, with the inscription, *Rex dixit, et factum est.*—(The king said it, and it was done.)—General Heydersdorf, whose cowardice or treachery had involved such sad consequences, was summoned by his countrymen before a council of war, and condemned to death. The Emperor, however, granted him his life, but banished him from the Austrian and Suabian circle, beyond the barriers of which he was transported in a butcher's cart, with every mark of ignominy. In 1697, peace was signed at Ryswick, and the Palatinate again began to raise her fallen head; the town emerged from its ashes, the various public buildings commenced erecting, and the University, which had existed but as an empty name around the ruins of its schools, at the beginning of 1700, once more became the resort of the youth of Germany

John William was succeeded, 1716, by his brother Charles Philip, who took up his residence at Heidelberg, and directed his attention to the restoration of the castle; and financial records which still exist, show that much was laid out in repairing the damages of this ancient palace. Not satisfied with these necessary preliminaries, this elector entertained magnificent plans for its further embellishment, and increase, which, had they been prosecuted, would have doubtless preserved it to this day, as the proudest of royal residences. But a fatality seemed to attend all efforts for its re-instatement, and those naturally most interested in its preservation, proved its greatest enemies. Among the improvements projected for the town, it was proposed to fit up the church of the Holy Ghost, (which then, and to this day, by means of a trumpery partition-wall, serves for both Catholic and Protestant services,) entirely for the former worship; the Elector promising to erect in its stead a new church for the Reformed portion of the community. This, however, necessitating a trifling alteration in the Heidelberg catechism, and interfering with some old German dogmas, the Burghers made every opposition, and Charles Philip, in a fit of disgust, removed his residence to Manheim, and employed the enormous sums appointed for Heidelberg, in the erection of a palace, and in making extensive additions to that city. Too late did the citizens repent their shortsighted obstinacy; the workmen were withdrawn from the castle, and much traffic from their town; and the solitude of the ruined walls was alone interrupted by the water-cart, which daily fetched its load from the royal fountains for the court at Manheim.

Charles Philip, dying the 31st of December, 1742, Charles Theodore, of the house of Sulzbach, undertook the government, the 1st of January, 1743. Twenty years elapsed before this Elector visited the crumbling halls of his predecessors, when, charmed with its regal grandeur and romantic beauty, he determined to repair a portion for a temporal residence. Again, though from a different quarter, were the plans of restoration frustrated; that very night a thunder storm broke over the ruins, and a flash of lightning taking effect, reduced the castle to the state wherein we now see it.

On Charles Theodore's death, Maximilian of Bavaria assumed the Palatinate; but under the division of Europe by that arch king-maker and deposer, Napoleon, it was allotted to Charles Frederic, Grand Duke of Baden, then a man of seventy-two, who directed that every care should be bestowed in preserving the beautiful ruins, and appointed the laying out of the gardens in the style they now present. In 1811, he was succeeded by his grandson Charles, who dying in 1832, his eldest son, Leopold, a prince of the highest worth, was unanimously declared successor. The charge of preserving the castle is vested in the hands of the Heidelberg corporation, who, although doubtless worthy citizens and excellent members of society, were the last men fitted for such a trust. Big with self-importance, and guided neither by love of antiquity, or feeling for the picturesque, they have continued year by year officiously picking at the castle, endeavouring to make old new, and crooked straight, till much that had survived the violence of its foes, has fallen before the scarcely less destructive civilities of its friends. Such was the extent of the subterranean cellars, groined passages, chambers and dungeons, that it were hard to say whether the castle occupied most space above or below ground. The writer had personally explored this portion, and regretted the destruction of some of its most interesting compartments;—now, by a late corporation edict, all the entrances to this lower world have been beaten down or filled up, and thus it will probably remain, till the plough of some future generation again lay it open to the light of day. Further, the gorgeous pillars, and architectural ornaments interspersed in the building, and especially in the suite of apartments called the Knights' Hall, have been sawn in pieces, and used for different purposes, and many a wooden bench in the surrounding gardens, is supported upon a capital, whose exquisite elegance reminds us, that its form was dictated by the taste of a Raphael.

Nevertheless, Heidelberg Castle still offers, and must for centuries offer, a powerful attraction to all true lovers of antiquity and beauty, and among the thousands who yearly throng through its empty portals, not a few imbibe an impression of symmetry, strength, gorgeousness, and grandeur, which can never be effaced.

He that does not know those things which are of use and necessity for him to know, is but an ignorant man, what ever he may know besides.—Tillotson.

Excellence is never granted to man, but as the reward of labour. It argues, indeed, no small strength of mind to persevere in the habits of industry, without the pleasure of perceiving those advantages which, like the hands of a clock, whilst they make hourly approaches to their point, yet proceed so slowly as to escape observation.—Sir Joshua Reynolds.

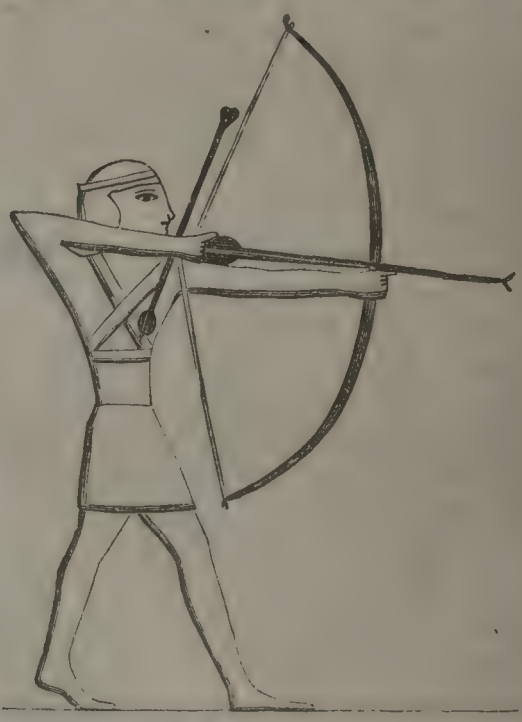
ILLUSTRATIONS OF THE BIBLE FROM THE MONUMENTS OF ANTIQUITY. No. VII

THE BONDAGE OF THE ISRAELITES IN EGYPT.

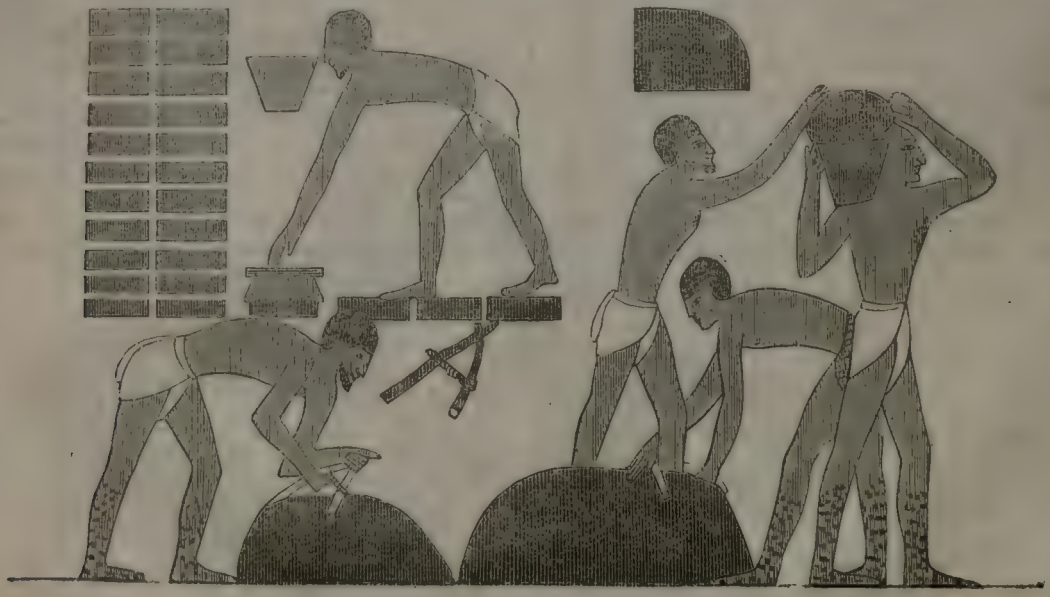
THE interval between the death of Joseph and the birth of Moses, was marked by an important change in the constitution of the Egyptian government, concerning which our authentic information is remarkably indirect and scanty. Several very able writers have laboured with more or less success to elucidate this very obscure period, and the following summary will be found consistent with the Scripture narrative, the Egyptian monuments, and the fragments of Manetho preserved by Josephus.

After the Israelites had settled in Goshen, they were engaged in active hostilities with the nomade tribes of Syria and Palestine. A singular record of these wars is preserved in the book of Chronicles, where we find enumerated among the sons of Ephraim, "Zabad his son, and Shuthelah his son, and Ezer and Elead, whom the men of Gath that were born in that land slew, because they came down to take away their cattle." (1 Chron. vii. 21.) From this interesting passage we obtain information respecting the condition of the Hebrews in Goshen, previous to their being reduced into slavery, which we find nowhere else recorded. We find that they loyally fulfilled the conditions of the tenure by which they held the land of Goshen, namely, checking the incursions of the eastern nomades; they not only did so, but carried the war into the enemies' country, and swept the plains of Palestine even to the distant city of Gath.

The bow was the favourite weapon of the Egyptians, and is so represented on the monuments. It deserves also to be remarked, that the Egyptians drew the bow to the ear, not to the breast as was usual with the Greeks and Romans; consequently, their bows were



more powerful, and their arrows better aimed than those of other nations. It may be added that the



Israelites, after their settlement in Canaan, appear to have neglected archery, for we read that, immediately after his accession, David "bade them teach the children of Israel the use of the bow." (2 Samuel i. 17.)

From the brief narrative in the book of Chronicles, it seems that the Hebrews in Goshen enjoyed a qualified independence; they made wars upon their own account, and retained all their pastoral usages. In some of their expeditions they were unsuccessful, and perhaps subjected to very severe reprisals.

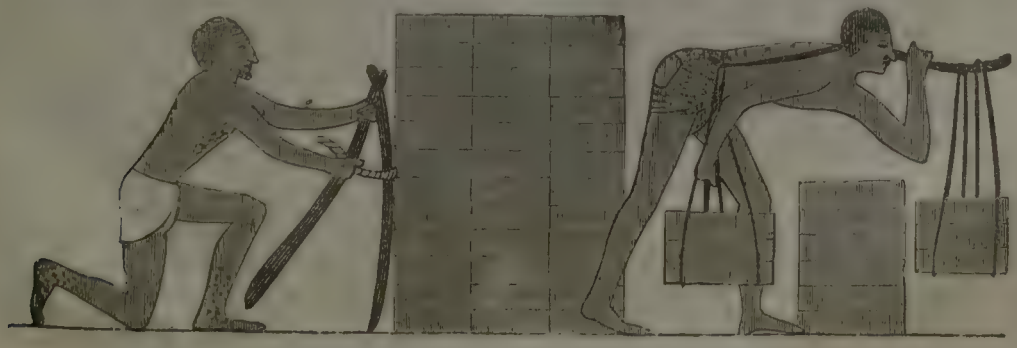
Manetho now becomes our sole guide; he informs us in substance, that a nomade race, settled on the north-eastern frontier of Egypt, invited the Hyksos, who had been anciently overcome and expelled, to return into Egypt, and that these barbarians obeyed the summons, subdued Lower Egypt, and reduced the inhabitants to slavery. Many circumstances recorded in Scripture, lead us to believe that the Pharaoh who tyrannized so cruelly over the Egyptians, belonged to this intrusive dynasty of the Hyksos; he is described as "a king who knew not Joseph," consequently, he must have been a stranger unacquainted with the benefits which Egypt had derived from the enlightened administration of that patriarch, for it is scarcely credible that any native Egyptian could have been ignorant of those circumstances. This Pharaoh also asserts, "the people of the children of Israel are more and mightier than we;" which is scarcely credible if it be understood of the whole body of the Egyptian nation, but it is very possible, nay very probable, that the savage race of conquerors may have been inferior in number to the smallest division of the races which inhabited Egypt. At this very hour, the Turks are the least numerous part of the Turkish population, and the jealousy with which they consequently regard all the other races subject to the Sultan, is the greatest obstacle to the regeneration of their empire. Finally, one of the tasks which this monarch imposed on the Hebrews, was the erection of treasure cities, that is, fortresses to secure the plunder which had been wrested from the native Egyptians. When Joseph, under a native Pharaoh, had received all the money of Egypt in exchange for corn, we do not find that he was compelled to erect any fortresses for its security; such a precaution was necessary only under the iron rule of a barbarous foreigner and conqueror.

The tyranny of Pharaoh commenced by his setting "task-masters" over the Israelites, "to afflict them with their burdens." We find many representations of these cruel task-masters on the monuments; they are armed with formidable whips.

"The Egyptians made the children of Israel to serve with rigour, and they made their lives bitter with hard bondage, in mortar and in brick, and in all manner of service in the field; all their service wherein they made them serve, was with rigour." (Exod. i. 13, 14). The manufacture of bricks was so very toilsome and painful an employment, that it was usually the work of slaves and captives. Among the monumental paintings, we find representations of different races of people employed in this degrading labour. Some of them being bearded, and otherwise pourtrayed with characteristics strikingly different from those of the Egyptians, it can hardly be doubted that the Jews are meant, and such paintings may, therefore, be taken as historical records of the state of bondage of the Jews in the land of Egypt. These representations, too, are the more worthy of note, because, we see some native Egyptians, also compelled to endure the same toil, whence the picture may fairly be regarded as the memorial of a time, when both the Israelites and the native Egyptians were forced to become the slaves of a foreign conqueror, just as both the Arabs and the Fellahs of modern times were equally subjected to the tyranny of the Turks.

The clay before being wrought was tempered with water, and broken into small particles by an instrument resembling the hand-plough, described in a former article of this series. This process was equally painful and unwholesome under the burning sun of Egypt, where the moist exhalations from humid clay have always been found very deleterious.

When the clay was properly tempered, it was moulded in a shape, as is still the practice in the modern manufacture of bricks. Indeed it is scarcely possible to avoid remarking, how very similar the processes of the necessary arts of life, represented on the Egyptian monuments, are to those which we see every day around us. It does not appear that the Egyptians burned their bricks, though, as we shall hereafter see, they were acquainted with the use of



kilns. They preferred drying them in the sun, a custom not wholly disused in Britain, though the lower temperature of our climate renders it far less efficacious than in Egypt. The piling of the bricks, and the mode of their transport, are represented in the accompanying engravings.

A VISIT TO THE SCHOOL FOR THE INDIGENT BLIND,

IN ST. GEORGE'S FIELDS, SURREY.

IT is an old and common remark, that places and objects of interest which we have constant opportunities of visiting, frequently remain unseen, and are, therefore, unknown to us, except from the reports of others. It is equally true, that in order to form a just estimate of many of the admirable institutions with which this country abounds, it is necessary to make a personal inspection of them. The quantity of accurate information which is thus derived from the fountain-head, cannot but be improving to the mind; nor does it fail to increase the materials for profitable and engaging conversation. But we are not ashamed to own, that a far better result is, or ought to be produced, by such scenes as we will now endeavour to describe. The heart is touched: every benevolent feeling is called into play: with pity for the distressed is mingled the joy at witnessing the mitigation of their sorrows: a sentiment of gratitude arises to the Giver of all good, for the several compensations He has granted in special cases of infirmity, as well as for our own positive blessings: and, above all, the effect on the kind and thoughtful visiter will be a desire to aid, according to his means, in the glorious work of Christian charity.

These remarks have been suggested by a survey I have just made of the School, established in 1799, for the support and instruction of the Indigent Blind. The object of this Institution is to teach the inmates a trade, by which they may be qualified to provide, either wholly or in part, for their own subsistence. Applicants who have a greater degree of sight than will enable them to distinguish light from darkness, cannot be placed on the list of candidates for admission. Of the description of persons totally blind there are now sixty males and sixty-two females in the school, some of whom were born blind; others, whose claim on the compassion of their fellow-creatures is stronger, and more affecting, from their having once possessed the precious gift of sight, and lost it by illness or accident.

After passing through the rooms of the new building, which is a very handsome fabric, calculated, when finished, to accommodate an increased number of pupils, I entered a large apartment in which the males, ranged at intervals along each side, were busily occupied in making baskets, of different degrees of texture, large hampers, cradles, &c. It was impossible not to be struck with the air of cheerfulness which pervaded the forms as well as the faces of these persons; so that seeing them active and industrious over their respective tasks, one might easily forget, for a time, their peculiar privation. The predominant expression, however, in their physiognomy is repose, or tranquillity of features, owing, probably, to their regular habits, and freedom from a variety of those disturbing causes which necessarily operate upon the many, particularly in the busy pursuits of a large and crowded city. In the basket-room I noticed only one painful instance of unfitness for even the easiest branch of work. It was that of a poor youth, whose brain seemed to be oppressed, and whose mental ray was probably dimmed, if not extinguished, by the same cause that had produced his physical blindness.

I next proceeded to an apartment belonging to the Shoemakers, some of whom were learning their craft from superintendents appointed for the purpose; while the majority showed a readiness and execution which were perfectly astonishing. A strong well-finished shoe was placed in my hands, which I thought would have served any gentleman's foot this wet wintry day; while the smiling artist, whose name, if I remember right, is Wallenger, had the fellow to it on his lap, nearly completed.

The impression being fresh upon my mind, I now venture, at the hazard of wearying some of my readers, to mention the Mat-room, where all sorts of brown and white rope door-mats, fine bright mats, bordered with coloured worsted, worsted rugs for hearths and carriages, were being carried on in such a regular and business-like style, that if, for a moment, in admiration of the articles, I ceased to remember the condition of those who wrought them, I was instantly reminded of this truth,—"That where one sense is defective, another is generally more perfect." So delicate is the touch of these blind persons, and so strikingly do they illustrate that wonder, to which public attention has recently been called in a remarkable manner,—the wonder of the human hand!

But it is time to say a few words respecting the female part of this excellent Institution. The girls were all assembled in a large airy room, and employed in knitting stockings, in needle-work, and in preparing household linen, and linen for the scholars. A few of them were as busy as bees, in platting a singularly-constructed patent sash-line, clock and clothes-lines, on a machine adapted to the use of the blind. I was informed, that since the first manufacture of these different kinds of line, a very material improvement has taken place, and that the sash-line, thus made, has been approved by eminent builders.

From a review of this slight sketch of the steady career of industry within these walls, the reader will learn with more gratification than surprise, that the articles made in the year 1836 by the hands of the blind persons, were sold for 1790*l.* 17*s.* 6*d.*

On passing through a gallery to the room in which the females were assembled, I was pleased to hear the sound of sacred music growing more and more clear; till, on entering, I distinguished the words of the 149th Psalm, beginning,—

> O praise ye the Lord,
> Prepare your glad voice!

which was well sung by the blind girls in the midst of their work. One of them,—who was pointed out to me by my benevolent guide as a very good girl,—afterwards, on being requested, *threaded her needle* much more easily, as I told her, than I could have done. She smiled, and modestly answered, that she had been for some time in the school. Another young woman, whose sight had been destroyed, about three years since, by the shameful heedlessness of a fellow-servant in firing a large pistol at her, unconscious of its being loaded, assured me, that God had been very good to her; that she was entirely reconciled to her lot, and contented in the station which she now filled. This declaration from her own lips was peculiarly gratifying, because I remembered her forlorn and desponding condition at about the time the accident occurred, when she thought she never should have been happy again.

I was now shown some books, printed in embossed types, for the use of blind persons, and designed

to be read by the touch. The letters in the several specimens were of various character; but of all the different plans, the simplest struck me as the best. This was Mr. John Alston's, the Treasurer of the Glasgow Asylum for the Blind, who has recently added to that Institution a fount of types and a printing-press, and has completed the whole of the Four Gospels in relief, in two large quarto volumes, at 9*s.* 6*d.* per volume. The teaching of the blind to read has engaged the attention of the benevolent for some time past: and Mr. Alston's plan, which consists in using the common Roman capitals, sharply-formed, has proved the most successful; the children, if tolerably apt scholars, learning it in a very short time. Thus, though "knowledge is, by one entrance, quite shut out," they are instructed in the inestimable truths contained in the word of God.

Their hands can read, their fingers trace
The page of Truth and Love;
And thus they joyfully embrace
The message from above.

The most affecting part of the visit, however, yet remained. I well knew the taste for music possessed by blind persons generally; indeed it has frequently been a pleasure to me to reflect, that such a delightful resource should have been placed so completely within their reach. "The Hymn of Eve" was played and sung correctly, and with considerable feeling. After a short pause, one of the girls was desired to recite that beautiful chapter of Isaiah, beginning,—"Ho, every one that thirsteth, come ye to the waters, and he that hath no money; come ye, buy, and eat; yea, come, buy wine and milk without money and without price." As soon as she had ended, one of her companions repeated with just emphasis, and in a pleasing tone of voice, the 8th chapter of St. Paul's Epistle to the Romans; and certainly two portions of Scripture more consolatory, or more abounding in passages of deep and universal concern to all, be their outward circumstances what they may, it would be difficult to select. The 18th verse sounded uncommonly affecting:—"For I reckon that the sufferings of this present time are not worthy to be compared with the glory which shall be revealed in us." All, or nearly all, the female pupils, as I was informed, know the Psalms, (the prose version, used in our Liturgy,) throughout, and some can repeat any part of the Four Gospels. Listening to the inspired passages, my mind stretched onward to the period, when this mortal shall have put on immortality, and to that city which hath "no need of the sun, neither of the moon to shine in it; for the glory of God doth lighten it, and the Lamb is the light thereof; for there shall be no night there." In that perfect day, thought I, shall not this desolate being, who walks by faith now, be gifted with a clear view of the Divine majesty; whilst many of those, who, humanly speaking, are walking by sight, and whose inward gaze of a future world is dimmed and uncertain, shall be pronounced blind? Yes; although, independently of their privations, these sad objects doubtless have their trials; yet, removed as they are from the temptations of a densely-peopled and vicious metropolis, brought up in regular habits, taught to read and to pray, they possess privileges, they enjoy advantages, the value of which it is difficult to calculate. With such reflections, I listened with pleasure to the following lines composed by one, who, if I mistake not, was formerly an inmate of the School, and addressed to the friends of the Institution. I never can forget "the deep, the low, the pleading tone," in which they were recited. And with these I shall conclude my narrative.

From Chaos sprang the teeming Earth,
At the Divine command;
And the untiring Sea had birth,
'Neath the Almighty hand.
But darkness lowered upon the deep:
Creation's first, long, silent sleep
Still hid the world in night:
Till, with a voice that pealed through space,
From His most high and holy place,
God said, "Let there be light."

"And there was light!" and with it grew
The glory of the day:
The vast, the wonderful, the new,
Were seen beneath its ray.
Not hidden was the meanest root,
The lowliest flower, the humblest fruit,
All burst upon the sight:
For unto each, as if to prove
His universal care and love,
The Lord had yielded light.

Praise be to God! another ray,
Not less divinely given,
Points, through his blessed Son, the way
To happiness and heaven.
And thus your boundless charities
Have spread before our sightless eyes,
Locked in eternal night,
That holier radiance, mild and pure,
Which makes our soul's salvation sure,—
The glorious Gospel light!

We cannot thank you as we ought,
But were our hearts laid bare,
You'd see each fond and grateful thought
Pour'd out in silent prayer.
And when we meet before the throne
Of Him to whom all deeds are known,
How shall we hail the sight
Of the pure glory, that will bind
The brows of those, who taught the blind
To seek the living light!

M.

AMUSEMENTS IN SCIENCE.

No. V.

ARITHMETIC.—Part 2.

We all know that if a cipher be added to any number of figures, the effect is the same as if they were multiplied by 10: if two ciphers be added, the same as if multiplied by 100. On the same principle, to multiply by 11, place a cipher at the end of the number to be multiplied, and the original number itself immediately under; then add them together, and the answer is obtained. For example, to multiply 368,426 by 11, do thus—

3684260		368426
368426	or thus,	368426
4052686		4052686

Numbers which increase by what is termed arithmetical progression, for instance, 2, 4, 6, 8, 10, each succeeding term increasing by 2; or 2, 5, 8, 11, 14, in which the terms increase by 3; or any other number, possess some curious properties.

In every arithmetical progression, the sum of the first and last terms is equal to that of the second and last but one, and to that of the third and last but two, &c.; or to the sum of the two middle terms, when the number of terms is even; or to double that of the middle term when the number of terms is odd. For instance, if the number of terms are even, as

1, 4, 7, 10, 13, 16,

16 and 1 are equal to 17, and the two middle terms, 7 and 10, are also equal to 17: if the series is uneven, as

1, 4, 7, 10, 13, 16, 19,

19 and 1 are equal to 20, and twice 10, the middle term, produces the same amount. In the last series the

number of terms is 7, and the difference 3; the 7th term is, consequently, equal to the first with the addition of 6 times 3, or equal to 19. This property enables the scholar to obtain the amount of any term in the series, at any distance from the first, by a very simple proceeding. By this last property, we are enabled to show in what manner the sum of *all* the terms of an arithmetical progression can readily be found, for as the first and last terms make the same sum as the second and last but one, and as the third and last but two, &c., it thence follows, that the *whole* progression contains as many times the sum of the first and last as there are *pairs* of such terms. The number of pairs is, of course, equal to half the number of terms, and consequently, the sum of all the terms is equal to the sum of the first and last term, multiplied by half the number of terms.

Let us put the familiar instance of the man who picked up a hundred stones, one by one, placed in a straight line at one yard distance from each other, returning to a basket placed at a yard distance also from the first stone, one hundred times.

It is evident, that to pick up the first stone, and put it into the basket, the person must walk two yards, one in going, and one in returning; that for the second he must walk four yards, and so on, increasing by two as far as the hundredth, which will oblige him to walk two hundred yards, one hundred in going, and one hundred in returning.

It may easily be perceived also, that these numbers form an arithmetical progression, in which the number of terms is 100, the first term 2, and the last 200; by the rule already noticed, the number of yards he has walked is easily ascertained.

Yards.

2 distance walked for first stone.
200 distance walked for one hundredth stone.
202 sum of the first and last term.
50 half the whole number of terms, or the number of pairs of terms.
10,100 yards.

The distance walked, therefore, is equal to 10,100 yards, or nearly five miles and three quarters.

Under the head of Combination and Permutation, in our books of arithmetic, we have rules given, by which the number of different arrangements which can occur in the order of placing a certain number of counters can be ascertained. By the use of the following table, these operations can be much shortened, provided the number does not exceed 9.

1	2	3	4	5	6	7	8	9	10	
1	1	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8	8	2
		1	3	6	10	15	21	28	36	3
			1	4	10	20	A35	56	84	4
				1	5	15	35	70	126	5
					1	6	21	56	126	6
						1	7	28	84	7
							1	8	36	8
								1	9	9
									1	10

Suppose it is required to know how many ways 7 counters can be arranged 3 and 3. Look to the perpendicular band of figures in the table, the number at the head of which, is equal to one more than the number of counters to be combined; in this case, it will be the eighth column, seven being the number of counters. Then seek for the horizontal column of figures, whose distinguishing number is one more than the number of counters to be taken at one time, which in this instance is 3, the column, therefore, is numbered 4; by carrying the finger along these columns, until you come to their point of intersection at A, we find the number 35, the number of ways in which seven counters can be arranged by threes.

Two persons agree to choose, alternately, any number less than 11, and to add these numbers together until they shall make 100; by what means can one of them infallibly attain to that number before the other?

100
11
89
11
78
11
67
11
56
11
45
11
34
11
23
11
12
11
1

To effect this, subtract 11 from 100, the number to be reached, as many times as possible; this will give the remainders,—89, 78, 67, 56, 45, 34, 23, 12, 1. By a knowledge of these numbers, the party who writes down the first number is certain of reaching 100 first, if he can count any one of these numbers. Let us suppose, for example, that the first person who knows the game, takes 1 for his first number; it is evident that his adversary, as he must count less than 11, can, at most, reach 11, by adding 10 to it, the first will then take 1, which will make 12; if the second takes 8, which will make 20, the first will take 3, which will make 23; and, proceeding in this manner, he will reach successively 34, 45, 56, 67, 78, 89; when he attains the last number, it will be impossible for the second player to prevent the first reaching 100 before himself.

It is evident that, if both parties understand the game, he who begins must inevitably win.

If a piece of square pasteboard is divided into nine cells, how can the following numbers of counters be placed in the outer cells of the square, as that they all be placed, and yet there shall, in every case, be nine counters, and no more, in each outer row of three cells? The numbers of counters are 18, 20, 24, 28, 32, 36. The following tables resolve this problem, and require no explanation.

5		4
4		5

4	1	4
1		1
4	1	4

3	3	3
3		3
3	3	3

2	5	2
5		5
2	5	2

1	7	1
7		7
1	7	1

	9	
9		9
	9	

READ not to contradict and confute, but to weigh and consider. Some books are to be tasted, others to be swallowed, and some few to be digested; that is, some books are to be read only in parts, others to be read, but not curiously; and some few to be read wholly, and with diligence and attention. Reading maketh a full man, conference a ready man, and writing an exact man.—LORD BACON.

HE that wants good sense is unhappy in having learning, for he has thereby only more ways of exposing himself; and he that has sense knows that learning is not knowledge, but rather the art of using it.—*The Tatler.*

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A BRIEF HISTORY OF NAVIGATION.

PART I.
ON THE NAVIGATION OF THE ANCIENTS.

Rude as their ships was navigation then,
No useful compass or meridian known
Coasting they kept the land within their ken,
And knew no North but when the pole-star shone.
DRYDEN.

EGYPTIAN POTTERY-FLOAT.

INTRODUCTION.

THE contemplative mind is supplied with matter for moral, and even sublime reflection, in viewing man in his more natural state, weak, savage, and untutored; clad in the skins of animals constituting his food, which are captured with toil and difficulty; inhabiting a rude hut, and confined within the narrow range of an island girt by the ocean, which to him is interminable; knowing no other land than that on which he dwells, and never daring to lose sight of that land, in the frail bark in which he moves along his native coast. Then if, by a rapid transition, we behold man civilized and highly cultivated as he now is, borne along by—

The heaven-conducted prow
Of Navigation bold, that fearless braves
The burning line, or dares the wintry pole,

we feel the force of the oft-repeated truism, that man is a progressive being. Thus, it will furnish instruction to the reader, if we endeavour to fill up the long interval between these two conditions, in which we find man acting his part as a member of the human family, by tracing the progress of Navigation from the rude raft, or ill-constructed canoe, through the various stages of addition and improvement, until we reach that triumphant monument of human skill,—a ship of the line*. An improvement, so vast, is of course only one of the results of the advancement of nations in the scale of civilization; and this advancement is accurately tested by their collateral progress in literature, art, and science. As the first ministers to the reflecting tastes of its members, so the two latter supply their actual wants and increasing desires; and there have been found, at all times, persons ready to devote their energies to carry out those subjects, which a few fortunate and gifted individuals have invented, or improved. But the great bulk of mankind does not the less further the progress of civilization, though all do not invent nor improve: they serve as the power for carrying on the work, which is contrived and begun by that limited number of great minds, on which Nature has poured down her choicer gifts.

While thus laborious crowds
Ply the tough oar, Philosophy directs
The ruling helm.

In the present and succeeding papers it is our purpose, therefore, to trace the progress of Navigation from its earliest principles and practice, to its present comparatively perfect condition; and in doing so, it will be found convenient to adopt the following arrangement, and treat—

1st. Of the Navigation of the Ancients.
2nd. Of the Navigation of the Middle Ages.
3rd. Of Modern Navigation.

The first division will comprehend, as to time, all the period between the creation of the world and the downfall of Rome; that is, a space of about 4500 years.

ON THE RUDIMENTS OF NAVIGATION, TO THE FORMATION OF THE BOAT.

WHEN speaking of Navigation in the earliest stages of the world, the idea of the ark, used by Noah and his family, will readily enter into the minds of our readers. But we cannot consider the formation and use of the ark, in the seventeenth century of the world, as a commencement or link in the chain of nautical invention. The entire direction and means for accomplishing this stupendous work, were afforded by God, to effect a saving purpose in the midst of the miraculous destruction of the human race; when the power and skill of man would have been, in those times at least, impotent to withstand or elude the watery havoc of Nature. In addition to this, we must notice the absence from the ark of any means, or of any necessity, for its occupants *navigating* it from one place to another; which is essentially necessary to make it belong to our present subject. No intention of this sort is alluded to; the ark being merely a vast shelter rendered capable of floating on the water. For these two reasons, therefore, we conclude against assigning to this event in the sacred history, a place in this treatise.

We come, then, to regard the ocean as a part of the arrangement of the Almighty power for His own wise purposes; as among the *creatures*, which have been committed to the use of man; beneficial in various ways, which it is not our province to consider here, but only as it serves the purpose of a great high-way for the nations of the world; pre-eminent among which, and may it ever be, is our own country. Our subject takes not in its view a supernatural state of the floods of the ocean, but that, wherein there is "set a bound that they may not pass over; that they turn not again to cover the earth*." We contemn, therefore, the quailing lament of the heathen poet, Horace, who thus delivers himself:—

Jove has the realms of earth in vain
Divided by the unhabitable main,
If ships profane, with fearless pride,
Bound o'er the inviolable tide.

We see how ill-timed is this awe of the sea, when we remember as readers of the Inspired Volume, that it is written,—"They that go down to the sea in ships, that do business in great waters; These see the works of the Lord, and his wonders in the deep†:" and, when we call to mind, that, by means of ships, this Inspired Volume was brought to us, and has been carried out again to all parts of the habitable earth.

In the youthful condition of the world, and when all was new and untried, the innate love of exploring that which had not yet been seen, gradually extended the locality of the human race. Brooks, and such like streams, were soon forded, when new pastures, the impulse of hunting, and the

* See *Saturday Magazine*, Vol. III., p. 36.

* Psalm civ. 9. † Psalm cvii. 23, 24.

desire of novelty, prompted a change; and a mode of crossing the deeper streams was soon suggested to the observation of the savage, whose condition seems, by the testimony of Homer, to have been at its lowest pitch, when in ignorance of any means whatever, for crossing the water, which, though seeming, at first sight, to bar intercourse, does, in reality, promote it. The buoyancy of wood in the water is the germ of all his subsequent proceedings. Accident shows him that wood invariably floats; and on the fallen trunk of a tree he ventures, beyond his own depth, away from the land. The trunk of a tree, hollowed out, for a more convenient position of the body, (an idea derived, we are told, from a split reed, seen floating on the water,) forms the canoe, which is usually found among the most uncivilized of the human species. From this rude beginning to the noble vessels of our day, how great the interval of time, how slow the pace of improvement, and how absolutely necessary, for any permanent and comprehensive effect, the application of elements, which seemed at one time out of the reach and cognizance of man.

ANCIENT PICTURE OF AN EGYPTIAN SHIP.

We seem to learn from contemplating the first materials of antiquity, that man derived, from the natural objects which surrounded him, a notion of the forms and fashions of things which conduce to his benefit. The pitcher-flower, (*Nepenthes distillatoria,*) * presented to him a graceful and convenient form for his cups and vases; the leaf-covered grottoes infused into him the idea of arranging his architectural principles on the patterns of nature; and the movements of the finny tribe developed the secret of directing his path on the water with nearly the same ease as on land; the trunk of the tree hollowed out, as a receptacle for the navigator, accords with the body of the fish; the forepart of this trunk, when sharpened off to an edge, in order to cleave the waters the more easily, is assimilated to the head of the animal, while the forcible motion of its tail shadows out the rudder, which, by its lateral movements, serves the purpose of steering the boat, as the tail of the animal directs the motion of the fish. This step in Navigation is completed by adopting a method for propelling the vessel onwards, which method is furnished by seeing the use of the fins of the fish in forming a passage through the waters. When oars, sculls, or paddles came into operation at the instance of Atlas, an ancient African monarch, the *boat* was essentially complete.

The foregoing illustration condenses into one view the various traditions, which have been handed down respecting the first decided step in Navigation; for it matters little from what other quarter,—the swan, or any other aquatic fowl,—the suggestion arises to the human mind, so it agree with the beauty of nature in its physical utility.

The *raft*, or floor of wood, formed by the lashing together of two or more planks, seems to have been an early, as it is one of the readiest modes for passing and conveying rough goods along upon the water. In time of shipwreck, or for any temporary purpose of transport, its facility of make recommends it, when other modes fail. Thus Hannibal used rafts for transporting his horses and elephants across the Rhone. The Egyptians, in very early times, used the raft on the Nile. An improved sort of raft was found in use among the Peruvians, tapered at the prow, in order to pass through the water more easily; the planks were fastened together with leather thongs, by the unnoticed decay of which the bark would oftentimes fall to pieces, and its mariner and goods disappear under the waves. The celebrated timber-raft which floats down the Rhine to Dort, in the Netherlands, from the forests of Germany, is oftentimes 1000 feet long, and 80 or 90 feet wide, consisting of trees fastened together with iron spikes and cross-timber,—a floating island with a village at the top, and requiring nearly 500 labourers to manage it. When the raft is broken up and sold, it sometimes fetches a sum of £30,000. The same practice is used on the coast of Norway, thereby saving the trouble and expense of land-carriage.

On a board, or slight raft, the surf-swimmers of the Sandwich Islands, in the Pacific Ocean, pursue their pastime. They swim out to sea on this raft through a violent surf, plunging under every wave, and rising beyond it. In returning they are carried swiftly on the top of a large wave towards the shore, when they steer among the rocks, taking care not to lose their planks, for such a loss is deemed to be very disgraceful.

Somewhat superior in contrivance and effect is the construction of the pottery-floats of Egypt. Jars and various earthen vessels are made in great quantities in Upper Egypt; a large number of them are fastened together with cords and twigs into a triangular shape, having the mouths of the vessels upwards; they are then covered with bulrushes, and, being empty, are rowed as need may be, and steered down the Nile to Cairo, where the raft is taken apart and the articles are sold. Some remarks on these earthenware boats may be found in Vol. IX., p. 164, of this work.

It appears that, in very ancient times, a vessel was in use on the Nile, made from the planks of acanthus wood, so laid together as to lap over in the manner of tiling, and fastened with wooden pegs, the seams being tightened with leaves. It was also covered over with flags of the papyrus, and properly cemented, to keep out the water. In process of time an acanthus mast was added, to which was appended a sail, formed of papyrus leaves. This was the case in the infancy of Moses, and to such the prophet Isaiah alludes in the second verse of the 18th chapter of his book. In ascending the Nile the vessel was towed along; in its descent, it was steadied against the effects of the N. E. winds by a hurdle of wood let down from the prow.

By the term *canoe* is generally meant a single tree hollowed out boat-like, propelled onwards in the direction of the view of the Indian, who urges its course with paddles, which are worked perpendicularly in the water. The Macedonians, who saw the natives at the mouth of the Indus paddling in their canoes, thought they were digging the water with spades. Canoes are of various lengths, from 10 to 50 feet.

But the make and build of all the early naval structures depended simply upon the use they were put to, and the means at hand for their formation. We have from Herodotus the description of a vessel for conveying goods down the Euphrates to Babylon. A frame-work of willow was covered with skins, forming, when complete, a sort of large tub, which was managed by two men with long poles, without any regard to stem or stern. They were of various sizes, and carried an ass besides the merchandize; the animal was employed in conveying the vessel home by land when taken to pieces, as the downward force of the river's current prevented them from sailing up the stream. Major Rennel describes this vessel as being still in use in the lower parts of the river, under the name of KUFAH, or *round vessel*. Very similar to this is the *coracle*, consisting of a large basket, over which was stretched a horse's hide. This was found among the ancient Britons when the Romans invaded the island, and is still seen in use on the Severn, and among the people of South Wales. The American Indians use wooden-ribbed vessels, covered with skins, which vessels, owing to their lightness, can be carried overland, when it is necessary to avoid the rapids and waterfalls, which are numerous in the country. The Greenlander's canoe is covered in at the top with a skin, so as to shut up the lower part of his body when he is sitting in the vessel; the water may thus be kept out in the roughest seas.

The double canoe of the Society Islands is an ingenious contrivance for affording a safe platform, whereon the warriors may wage battle. Two canoes being placed alongside of each other, at a certain distance apart, planks are firmly fixed across, which make a stage safe from capsizing. The whole is so contrived, that the rowers may work underneath this floor, while the soldiers engage in battle above.

* See *Saturday Magazine*, Vol. II., p. 159.

The proas of the Ladrone Islands present another form of the canoe, the peculiar quality of which, we are told, is swiftness to the extent of 20 miles an hour; this results from their construction. The lee side, or that which is away from the wind, is straight, while the other is bowed out as usual. This causes both ends of the vessel to be narrow, and thereby exceedingly sharp, so that it pierces through the water the more readily, and needs no turning round when the voyager wishes to come back. In a rough sea they have a contrivance on the windward side of the proa called an out-rigger, (see Vol. III., p. 181, of this work,) to preserve a steady balance, and prevent its upsetting on the straight or lee side. The rapid motions of the sword-fish would seem to have suggested the idea of forming these *flying proas*.

The alder and poplar were used by the ancients for ship-building, as being hard and light woods, but oak and fir were chiefly sought after. The Greeks used chestnut and cedar, the latter of which they considered to be very durable. Cypress was valued for its not leaking, and elm was chiefly used for the parts of the vessel under water. Sometimes, in these days of nautical simplicity, a fleet of ships was formed within a month of the time when the timber spread out its leafy arms in the forest, haste, not skill, being used in their formation. When, however, time allowed, ship-timber was not always hastily felled, nor carelessly employed. The age of the moon, and the quarter from which the wind blew, were superstitiously heeded.

Tacitus describes the Swedish boats, seen by the navigators of his time, as being like the Northern yawls of the present day, which are peaked at both ends. These boats were, in all probability, used for piracy, which in a barbarous condition of society, is the mode of gradually establishing commerce. A galley, the prow of which resembled the weapon of the sword-fish, was used by the ancient Greeks, as also in more modern times, for cruising against the pirates of the Mediterranean, whose vessels were of a similar sort.

The materials with which the planks or other parts of these different vessels were put or fastened together, were various. Sometimes wooden pins were employed, and at other times they were connected together with thongs, made from the skins and sinews of animals; iron seldom, or never, coming within the reach of these primitive naval architects. The Icelanders and Esquimaux Indians were found to make their boats of long poles placed crosswise, tied together with whale-sinews, and covered with the skins of sea-dogs, sewed with sinews instead of thread. To stop leakage the ancients used lime and pounded shells, which being observed to waste away, pitch, resin, and wax were employed. Sometimes the crevices were first stopped up with flax, and then leather was employed for sheathing. We find sheet-lead used for the same purpose, and copper nails. For their tools they used flints and shells for cutting, while several of the bones of fishes served them to pierce, to saw, and to plane with. From these nature-suggested implements is derived, with improvements according to circumstances, a great portion of the tools with which the mechanic of modern days so skilfully performs his work.

ANCIENT ROWING-BOAT

We arrive now at the general term of *boat*, by which we understand a combination of every peculiar excellence afforded by each sort of water-conveyance mentioned before. The method of making and finishing off a boat is to be sought for in the science of Naval Architecture; but we may merely mention that, from the lightest and most substantial material, strongly compacted into the form which will attain most speed, and admit of most room and convenience for the rowers, whether they be one, two, or more, is produced the most finished specimen of the first and original class of naval structures.

THE SAIL.

About 1230 years before the Christian era, as far as we are able to discern actual fact through the hazy and fabulous record of profane antiquity, the adoption of *sails* promoted the nautical art beyond former conception, and served as an era in history by the simultaneous wonder and admiration with which the discovery, and the authors of it, were hailed by their fellow-men, whose knowledge and comfort were, in process of time, so much promoted thereby. The statements of the early writers of the world seem to concur in describing Dædalus of Athens, the most skilful mechanician of his day, as the individual who first pressed the wind into the naval service of man. His genius, sharpened by fear, when seeking to escape the vengeance of Minos, king of Crete, put up in his own boat, and in that of his son, a cloth, or cloths, to catch the passing gale, thus using its force to hasten on their frail barks. The singers and bards of the time, whose avocation was with the multitude, and whose recitations pleased in proportion to the quantity of the marvellous they contained, being themselves, from the very nature of their pursuits, easily led off from natural principles to the sublime and mysterious, chanted before those, whom rumour had already prepossessed, the flight of Dædalus and the unfortunate death of Icarus, his son. Dædalus, say they, had carefully fitted to his own body, and to that of his son, wings, constructed with feathers and wax. Thus equipped, they took their flight through the air over that part of the sea which lay between Crete and Italy. Icarus, with the rashness and unsteadiness of youth, sought a higher flight than his sire, and getting, in consequence, too near the neighbourhood of the sun, the waxen cement of his wings was loosened, which, thus becoming powerless, he dropped into and was drowned, in that part of the Ægean Sea, or Archipelago, which bore for ages after the appellation of the Icarian Sea. The point in this relation which we are chiefly interested in clearing up, is the youth's mismanagement of his wings. The fact of the passage of one of these persons from Crete to Italy, and the drowning of the other, is undisputed; also that they went over the water and not over the land. As we know that it is incompatible with the human frame to be buoyed up by wings in the air, and unnatural that greater heat should be experienced in rising above the surface of the earth, balloons being at that time out of the question, and being aware of the stretch and license which the rude and unreflective imagination can take, we see easily that Dædalus and Icarus, by cutting their way through the waters with sails swelled out by the wind, seemed to have flown over it with wings; and this the more veritably to those who regarded only, or chiefly, the novelty of the proceeding, and received their accounts from the echo of rumour. The vessel of Icarus then, who seems not to have had his sail sufficiently under control, was capsized, and thus, as truly said in the fable, "he dropped into the sea, and was drowned."

Many other voyages, under circumstances so novel for the times, have received the utmost embellishment of the poetic art. When we consider the surprise of ignorant people, at beholding floating castles with expanded wings, making their unassisted way over the sea, we discern easily whence arose the fiction of the flight of Perseus to the Gorgons, who, we are told by Aristophanes, was carried thither in a ship. The story of Triptolemus, who was feigned to ride about the world on a winged dragon, doing good to the human race, is easily understood, when we remember that he was employed by his countrymen to procure in a ship corn from foreign shores, for the supply of their necessities. The winged horse, Pegasus, was a ship of that name, fabled to have been the offspring of Neptune, the god of the sea. In a word, we thus account for the stories of griffins, or of ships transformed into fishes and birds, so frequently met with in the ancient poets.

It is probable that some natural object, such as the wing of a bird, suggested the idea of the sail. By some it has been referred to the *nautilus*, or sailor-fish, which is seen in the Mediterranean Sea, the Indian Ocean, and the Polynesian waters of the Pacific. It is oftentimes observed in calm weather floating on the surface of the water, using its side-fins as oars, its hinder one for steering, while its dorsal-fin, which is formed from a peculiar membrane, serves as a sail. When wishing to go down all is drawn in, with a sufficient quantity of water to make it specifically heavier than its own bulk of water, it then sinks in an instant: when wishing to rise again it ejects the water. (See Vol. VI., p. 149.)

The material of which the sail was usually composed was linen, or it depended upon the particular produce of the country which despatched a sailing vessel from its shores. A sail was, perhaps, at first most readily formed by the mariner's suspending his clothes upon a pole. In some countries they used leather, or skins of animals, for sails, as Julius Cæsar observed the Gaulish Venetians to do. Thus Hercules is said to have sailed with the back of a lion, because he used no other sail than his garment, which was the skin of a lion. In other countries they used sails made from twisted flax or hemp, as the native West Indians are found, at the present time, to use in making a sail, a sort of silky grass, plaited to the length and breadth required.

We do not find more than one sail used in the earliest ages, or more than one mast; their vessels had not even a deck. The sails were commonly white, which colour was esteemed more lucky, though sometimes they were of other colours. The vessels were painted red and sometimes blue, which latter colour was intended to correspond with the cerulean appearance of the sea, in climes where the blue sky overhangs the watery expanse, undimmed by clouds and vapour. When we read of the black ships of Homer, we must remember that they took this appearance from the pitch, with which they were externally covered to exclude the water. Sometimes other materials were used to produce the same effect, and hence a diversity in the colours of the ships. Such was the sort of vessels which conveyed the allied army to the plains of Troy. The size and number of the sails increased with the magnitude of the vessels and the length of their voyages, all which depended upon the importance of the nation, which, in the progress of time, by the searching spirit of commerce, or the desire of conquest, advanced the maritime arts.

The form and disposition of the sails in the vessel have been found to be different in different countries. We are told that, in ancient Egypt, the sail was suspended on two upright poles, so that it could be used only before the wind, as is the case with many of the South Sea Islanders, whose sails are made of matting. The sails of the New Zealanders and Polynesians are found to be of a triangular form, the former having the base upwards and the latter downwards; and, in a general view of the case, the condition of the savage state in our times will be found very much upon a par with that of early antiquity, at least as far as art and science are concerned, which consideration must be kept in view, if any question should arise in the reader's mind, as to why we seem to treat of the naval pursuits of modern barbarians in conjunction with those of the people who lived before the Christian era

GALLEY, FROM A PAINTING AT HERCULANEUM.

THE RUDDER, ANCHOR, CABLES, SHIP'S NAME, &c.

Before proceeding to consider the more perfect condition of ancient Navigation with reference to its effects, we shall present a brief view of some of its appendages in detail.

The rudder serves to regulate the course of the ship, as the tail of the fish guides the motions of its body. The principle is the same in both cases. When the rudder is in a right line with the central direction of the vessel, it is merely an enlargement of the keel. When drawn towards either side, it has to make way against a force of water, the resistance of which is in proportion to the angle formed by the rudder and the keel, and the rate of propulsion at which the vessel is urged along, or to the force of the surrounding current; so that the *stern* or hinder part of the vessel is forced aside out of its place by the resisting water, and the *prow*, or forepart, consequently, assumes an opposite direction, according with the movement of the rudder.

It seems that the original rudder was nothing more than one of the oars or paddles held sternwise by the person in the boat, which natural observation and practice taught him to steer the vessel by. This practice is even now far from obsolete. The ancient Greeks, we are told by Homer, used only one rudder; but as their vessels enlarged in size, they used two, one at the prow and the other at the stern: connected therewith by fastenings, termed *rudder-bands*, alluded to in Acts xxvii. 40; so that these were called *double-stern ships*, and could be propelled either way, without turning. Tacitus relates that the Germans used vessels of this sort. The use of the rudder-bands was to fasten the helm up out of the water, when the ship was left to drive, or take its own course; but, if they were loosened, as St. Luke relates, the rudder dipped into the water for use. We read of four rudders being employed, but nothing definite seems to be known of ships of this sort; nor of ships, which are mentioned as having two prows and two sterns.

It is a general feature in the maritime affairs of ancient nations, that their vessels in general could be conveniently carried overland, when so doing would tend to lessen distance; and for this purpose they were oftentimes so constructed, that they could be easily taken to pieces; as was often done, when they wished to pass over an isthmus. They were also drawn up out of the water, even for a single night. Hence, it is clear, that they were for a long time, at best, but sailing-boats; and that the anchor was not needed. The need or convenience of this grew with the size of the vessel. The Tuscans are said to have invented the anchor, while some ascribe it to Midas, whose anchor was long preserved in one of the temples of Jupiter. But, whatever means may have been originated by any party to

stay their vessels on the water, though the effect obtained was always the same, the instrument was various. The most ancient anchors were large stones, bored through the middle; sometimes they were made of wood, having lead inserted. In some places, baskets of stones, or sacks of sand, suspended by cords in the sea, served as anchors, by impeding the course of the ship by their weight. At length the anchor was made of iron, with one tooth, or fluke; and soon after two-fluked anchors became general. Sometimes they employed an anchor with four claws, or flukes; which seems to be what is meant in Acts xxvii. 29; although the ancients used more anchors than one, and usually dropped them by boats from the stern, contrary to the practice of the moderns, who let them down from the prow. The boat, being fastened to the stern, was usually towed along after the ship, unless in case of a heavy sea coming on, when it was drawn close up to the ship; as in Acts xxvii. 16. We learn from Bruce that the four-fluked anchor is still used by the Egyptians; and we should observe that St. Luke mentions that St. Paul was voyaging in an Egyptian vessel. Of the several anchors belonging to each ship, one exceeded the rest in size and strength. This was called *the sacred anchor*, and was used only in extreme danger; so that the phrase, *to throw out the sacred anchor*, was in process of time proverbially applied to those who were driven to their last shifts.

We find, upon one or two occasions, mention made of iron chains in use for dropping the anchor. Cables, however, were generally employed, made at first from leather thongs, or the sinews of animals. They then used flax, hemp, broom, rushes, or sea-weed. The ancient Greeks procured from Egypt ropes and cables manufactured from rushes and sea-willow. We must not omit to mention the ancient practice of *undergirding* the ship, mentioned in Acts xxvii. 17. By this is meant the passing of ropes several times round the hull, to prevent the timbers from starting and giving way, when the ship, in a very rough sea, is strained, and apt to lurch. It is even done now, upon occasion, when the vessel is not very large; as we find in Walter's account of Lord Anson's voyage, who relates the undergirding of a Spanish ship with six turns of a cable, during a violent storm.

It seems to have been the ordinary practice of the ancients, to place at the head or prow of the vessel an image, called the sign; which we see also in modern times. This gave then, and usually gives now, a notion of the ship's name. The sides of the prow were called *cheeks*, as this part of the vessel generally showed a human face, and was decorated with paint and gilding (see the engraving in page 35). The part of the vessel which cut the water, was called the *goose;* a great similarity being fancied to exist between the ship and this bird, while on the water. At the stern, often carved into the form of a shield, and elaborately painted, were small streamers. Here also was set, or in some way delineated, a representation of the deity to whose tutelary favour the ship was committed. To this deity daily prayer and sacrifice were offered, and this was the naval sanctuary. Taking this into consideration, and that ancient vessels were universally named after some beast, bird, or fish, we shall easily resolve many stories of antiquity, which contain facts under absurd and unnatural guises.

Ships were very usually termed *horses* among the ancients, which sets off in a clearer light the story of Neptune and Minerva contending for the honourable guardianship of the city of Athens. The horse, which the former gave, was a symbol of maritime affairs; as the olive, given by the latter, was of agricultural peace and quiet. Though the victory was at the time adjudged to Minerva, we read of her being an early patroness of Navigation. We are told that the poorer people of Gades, (now Cadiz,) a Phœnician colony in the south of Spain, called their small barks *horses;* and we know that the Nubian savages, at the present time, call a *sailing-boat* "a *water-mare*." About 1500 years B.C., the Princess Europa, we are told, was carried off from Phœnicia to Crete, by Jupiter, who had assumed the form of a bull: the credible version of which story is, that Asterius, King of Crete, whose wife she afterwards became, went to her father's court, prevailed upon her to elope with him, and conveyed her across the sea in a vessel having the sign of the bull at its head, and the shrine of Jupiter at its stern. The chariot with winged dragons, in which Medea fled from the vengeance of her husband, was only a ship with sails. The Elder Pliny tells us of a boy, who was carried by water some miles on the back of a dolphin to school; the vessel, in all probability, having a dolphin at the prow. Arion, the famous musician of Lesbos, having made great wealth in foreign parts by his profession, was returning home by ship, when the sailors resolved to kill him and seize upon his riches. Playing once again, at his last request, a favourite tune, he leaped into the sea. A dolphin, attracted by the melody, received him safely on its back, and carried him again to the court of the prince, whence he had set out. Arion, doubtless, escaped by a boat, the fore part of which consisted of a dolphin. The flight of Phryxus with his sister Helle, into Asia, on the back of a ram having a golden fleece, and her falling through giddiness into that part of the sea afterwards named the *Hellespont*, or *Sea of Helle*, now the straits of the Dardanelles, is explained by considering that Phryxus absconded with an immense treasure in the ship Aries or Ram, and that his sister Helle, who accompanied him, fell overboard by some accident or other. The ship in which St. Paul sailed away from the island of Malta, had the twin sons of Leda for its sign. The Gemini were the patrons of mariners, and were deemed to be present with mortals, when a sacred light played around the tops of the masts. This light is now known by the people of the Mediterranean coasts, as St. Elmo's fire, and is due to electricity, which is attracted by points. Many of the signs of the Zodiac, and other constellations, received their names from the ships of early days, which the unaffected admiration of the times resolved to honour with immortal remembrance, by a belief in their translation to the skies.

The people of Ægina, an island in the Ægean, and of Crete, an island of the Levant, are among the earliest people, who pursued navigation. The inhabitants of Corinth and Corcyra were the first to form a fleet; but the Cretans are said to have been the first to possess the empire of the sea.

ANCIENT SHIP, SHOWING THE SIGN, OR IMAGE, AT THE PROW

WAR AND MERCHANT SHIPS.

Thus far respecting naval affairs in general. We must now observe that the vessels of the ancients were distinguished into two chief classes; each possessing its own characteristic features; *war ships*, and *ships of burden*. The former generally had no sails, but were impelled by oars, and were of great length; so that *long ships* was a term equivalent with *ships of war*. The latter were of a rounder shape, and were mainly propelled by sails.

The people most distinguished for naval warfare before the Christian era, were the Phœnicians, Carthaginians, Greeks, and Romans. One illustration of their war-ship and mode of fighting applies to all; as each one seems to have been tutored by its predecessor in political existence.

War-ships were chiefly rowed with oars, that they might be able to tack about, and approach the enemy at pleasure. The number and appointment of oars became more nume-

rous, as navigation improved. There were, according to the size of the vessel, rows, tiers, or banks of oars; not placed on the same level, but having the seats fixed at the back of each other in the manner of stairs. The most usual number of these rows was three, or four, or five. There were, however, many vessels, which had more tiers; and the ship's class was determined by this property. The first long ships were rowed, we are told, with fifty oars, in the thirteenth century B.C., and the notion of them was derived from Egypt. The size of this species of vessel, as depending upon the extent of the rowing-banks, became, we read, after many ages, enormous.

In the reign of Ptolemy Philopater, King of Egypt, about 200 years B.C., a ship of forty tiers of oars was constructed, each tier containing one hundred rowers. This ship carried, moreover, its complement of sailors and soldiers, and was called the Isis. A still more wonderful vessel was constructed about the same time by Archimedes, at the command of Hiero, King of Sicily. This ship had in it banqueting-rooms, galleries, stables, baths, and fish-ponds; it had also a temple of Venus, the floors and sides of which were painted with scenes from the Iliad of Homer. There seems to have been a rage at this time for constructing these huge machines, which the deficient nautical skill of the times could not apply to any useful purpose. They resembled floating islands, and, indeed, we are told that these, and such like fabrics, were too unwieldy for use, and served merely for show and ostentation. In a word, if there be no exaggeration, which is much suspected, and we be under no misapprehension, which is much feared, respecting these accounts, they serve, at least, to show that human nature often impotently attempts to outdo itself. The most usual size for vessels, in the more perfect condition of ancient navigation, allowed five tiers of oars, holding three hundred rowers, above whom were two hundred fighting men. The oars of those who were at the lower part of the vessel, and, consequently, nearer the water, were shorter than those of the rowers above, whose oars increased in length proportionally as they ascended. We are not well informed of the manner of applying the oars from so many tiers as we have here mentioned, or even more; and how the mechanical force, necessary for working the upper and longest oars, was effectively brought into play, but such we see on several coins and other fragments of antiquity. Two large holes at the prow of a vessel, occasionally used for oars, were called the *ship's eyes*. It has been noticed by voyagers, that in the fishing-boats of the Society Islands, these eyes are made of shells. To *bear up into the wind*, Acts xxvii. 15, means, when literally translated, *to present its eyes to the wind*,—in modern nautical language, *to loof up against the wind*.

Ships of war had at the prow a wooden projection, covered with brass, termed a *beak;* the use of which was to dash violently against an enemy's vessel, and sink or shatter it. Pieces of wood, placed on each side of the prow of a vessel, to ward off or counteract the force of the enemy's beak, were termed the *ship's ears*. The Romans, having defeated the Carthaginians in several naval encounters, carried home as prizes the beaks of the enemy's ships which they had captured. These they hung up in the Forum, about the tribunal from whence the public orators harangued the citizens. This pulpit was, therefore, called the *rostrum*, which is the Latin for *beak*. Hence, a person about to speak publicly, is said *to mount the rostrum*.

Over these vessels were certain raised platforms; at their sides were projecting stages, and on their forecastles were towers, on which the soldiers stood and levelled their missive weapons with greater force and certainty against the enemy: whereas the rowers, by their position in the hull of the vessel, were always secure from damage. Sometimes an attempt was made to sink the enemy by discharging a heavy weight of stone or lead into his ship. In the case of a siege on the sea-side, ships were connected together, along the circuit of water surrounding the walls; on which ships high towers were erected at intervals, to enable the besiegers to annoy the townsmen, and perchance to scale the walls, (see p. 40.) The besieged would, by means of a long lever, invented by Archimedes, lift the invading ships up out of the water; and suddenly letting them go, dash them to pieces. Towers made so as to be quickly raised, or let down, were used also in general naval engagements. Many ships had coverings of hides or skins, to protect all who were in the vessel from the darts of the enemy. The shields of the soldiers were usually hung upon the railing (see p. 40) which begirt the ship, and above which the stages appeared.

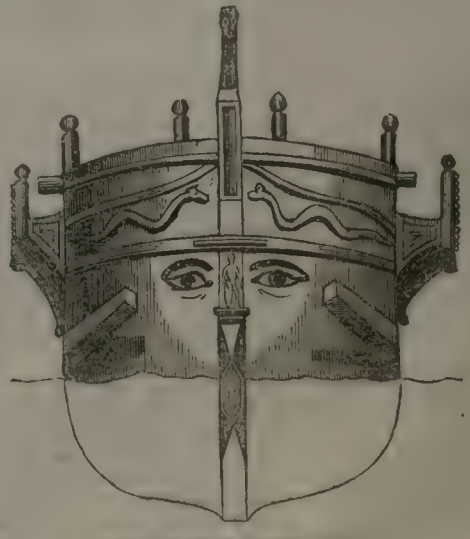
In the event of an engagement, everything was put out of the vessel which would not be wanted in battle. If the ship had sails, they were furled and put away; and it is to be observed that the ancients always avoided fighting in stormy weather. The order of battle was generally that of a half-moon, the best men and ships being stationed at the horns, or wings, for the purpose of breaking the enemy's line by beaking. Sometimes the semi-circle was directed *convexly* towards the enemy; at other times *concavely*. Upon some occasions the fleet was drawn up in a circle, as with the Peloponnesians; at others, in the form of the letter V, for the purpose of penetrating the body of the adverse squadron.

Prayer and sacrifice preceded the battle, accompanied with the exhortations of the admiral. The signal for engaging was given by sound of trumpet, which was repeated round the fleet, as also by hanging out a gilded shield, or banner, from the admiral's galley; which vessel was moreover distinguished by a red flag. The battle continued as long as the shield, or banner, was elevated. A pæan, or war-song, to Mars was chaunted by the party which made the attack; and a hymn to Apollo was sung by the victors.

The admiral's galley would begin the engagement by endeavouring by a sudden, close, and parallel movement, to break, or sweep off, the whole set of oars on one side of a hostile vessel, which would thereby be disabled from performing any further manœuvres; or they might seek to disorder the enemy's line by attacks with the beaked prow, while the soldiers assailed their rivals with slings and darts, and eventually with swords and spears. In fact, the latter part of the battle would more nearly resemble a land-fight; for, when the ships came to close quarters, one party or the other would throw out iron grapnels, by which the vessels were locked together, and the weaker prevented from escape. This plan was usually resorted to by the party which was the inferior of the two in naval tactics. We find boarding-pikes mentioned by Homer as being used in naval encounters.

To enter more into detail of this sort would lead us insensibly from our subject. We may remark, however, that if the country which a fleet was sailing to, was hostile, or if there was no good harbour, they would draw their ships on land and form a naval camp.

The naval business of Athens had very great reference to war; but as conquest and the extension of dominion was the sole object proposed by the Romans in their assumption of naval tactics, all the proper business of navigation, from the master to the rower, was allowed to lie in the hands of slaves, or of the lowest classes. Hence the Romans make no figure in maritime history.



EARS AND EYES OF THE SHIP

We have now to make a few remarks on the trading-vessels of the ancients; premising that, in natural order, this should have come first: as marine vessels originated in the necessity for transport, either of person or goods. Piracy, or robbery by sea, deemed to be an honourable employment in the infancy of a nation, was excited and encouraged by the convenience thus afforded; and then followed naval war.

The oval form of the merchant ship is, of course, to be referred to the accommodation of passengers, and the stowing away of baggage. It seems to have been flat-floored, broad, and of small draught of water, not very dissimilar to the Chinese junk seen in our day, which is thought by the best reasoning to be only a counterpart of the ancient ship of commerce. The length of the trading vessel was four times its breadth, while the war galley was eight times longer than broad. As the war ship, which had a mast, was distinguished by a helmet thereupon, and a banner at its bow, so a basket, emblematic of its nature, was suspended from the mast of the trading vessel.

The common burden of their best and largest trading-vessels seems to have been fifty or sixty tons, though much larger ones are alluded to; to the accounts of which there is attached the same uncertainty as we previously spoke of in the case of the rowing-galleys. An obelisk of fifteen hundred tons' weight was brought from Egypt to Rome, and placed in the Circus by Constantius, where it now stands. The same vessel carried, we are told, more than eleven hundred tons of pulse, placed at one end of the ship to balance the stone at the other. Such vessels as these, called Ætnas, or moving mountains, were not valued for ordinary use, being too cumbrous and unmanageable. Merchant-vessels having to pass from one country to another, were chiefly governed by sails, as mere transports were towed along the banks of rivers by cords.

We are not well informed what convenience the ancient mariners had for sleeping in their ships. Berths, for the convenience of passengers on board the foreign trading-ships, seem to have been made at the sides of the vessel, as with us; see Jonah i. 5: but we infer that the resting-places of the sailors themselves were of a chance-like nature, and no wonder that it should be so, as ancient navigation did not permit vessels to be long out at sea, or far from land. Ulysses, we read in Homer, slept on skins at the stern, and the rowers who, in the course of time, were selected from slaves or malefactors, reposed upon the benches where they had toiled. Any superior accommodation seemed likely to deteriorate the hardihood of the sailor; and Alcibiades the Athenian commander, Plutarch tells us, was censured for having on board a bed hung upon cords!

AN ANCIENT VOYAGE.

Having hitherto confined ourselves, in great measure, to the vessel and its detail, we pass on to the consideration of the ship, or fleet of ships, when making way over the waters; so that the observations which we shall here make will not relate to any particular order of shipping, unless so far as shall be specified at the time

The invariable time for sailing was that of Summer, when the heavens were genial, and the light of day exceeded the darkness of night; the means and experience of the ancient mariners did not permit it to be otherwise. Even with a smooth sea and fair wind, they could not for ages venture out of sight of the land, lest, in the apparently interminable waste of waters, they might be drifted about for ever: their voyages, therefore, to which they were tempted by trade and commerce, were a continual coasting; and vessels were, in certain circumstances, even towed along: being also often necessitated to land for provisions, they would not be long at a time out at sea, a thing which even the superstition of the sailors would have forbidden. Superstitious fears seem to have haunted sailors from the earliest to the present time; but these are, we trust, fast fading before the cheering light of the Divine Word.

It was an article of belief among the ancients, that a soul which had departed from a body unhonoured with the rites of sepulture, was condemned to wander in sorrow for a hundred years on the banks of the infernal river Styx, ere it could be admitted to a resting-place of bliss; being, therefore, in their landskirt voyages, at the mercy of the people of the coast, and impatient at the close confinement and restriction of the ship, having also their religious dread of the unfathomable and heaving deep, we need not be surprised that ages upon ages should pass away, and the shores of the Mediterranean, the first civilized portion of the West, be still the limits within which the naval art was practised.

When a voyage was contemplated, the ships, which had in all probability been hauled up on dry land, were pushed into the sea by the shoulders of the mariners, or by levers; or latterly, by means of a rolling-machine called a *helix*, invented by Archimedes, about 200 years B.C.

A fleet, or number of ships, being, therefore, about to set sail, every proceeding connected therewith became matter of religious parade and solemnity. Sacrifices having been performed, and each ship committed to the care of some deity, omens and prognostics were observed, and the trivial nature of some of them is such as to create a smile. The perching of a swallow on the mast, or the sneezing of any person to the left, would so perturb the minds of these enterprising sailors, as to delay the departure till the following day. When, however, nothing had occurred to mar the resolution of the voyagers, the ships were unmoored, and departed with oars or sails, or, perhaps, both, decked with flowers and garlands, and attended with prayers to Neptune and the other gods, from the voyagers and their friends remaining at home. When they had got a little out to sea, doves were let loose from the ships, which flying back to land, were hailed as omens of the safe return of the crew. The ship of the commander usually sailed on foremost, conspicuous for its gaudy ornaments: the others followed in order, and, when fairly out at sea, sailed three or more abreast, or alongside of each other, unless the weather grew rough and the sea unsteady; in which case they would keep off from one another, in order that the manœuvres of each vessel might not be hindered. Excepting under very favourable circumstances, they did not continue sailing through the night, but anchored in some cove or sheltered spot; or they drew up their ships on the beach, that all in the vessel might repose until the returning dawn. If they actually got out of sight of land, it was with the view of directing their course towards some headland, which they knew to lie in a certain direction.

In the progress of ages, as the knowledge of astronomy advanced, and various observations of the heavenly bodies were made and collected, the situations and bearings of places were, by these means, naturally attempted to be surmised. To navigate safely, and to trust oneself with confidence upon the pathless ocean, it is necessary to have always ready at hand, a safe and uninterrupted guide to the relative situations of places. Though it appears that the general principles of the loadstone were well known many ages before the Christian era, yet the polarity of a suspended needle was never dreamed of among the active nations on the western side of the ancient hemisphere, until within the last five hundred years. The early missionaries to China found that the compass had long been in use in that country*; but that curious people seem to have been the first to attain, in ancient times, a certain point of civilization, beyond which they have never since advanced. So that the ancient sailor, who had the greatest skill and means which his art afforded, could look only to the heavens for assistance; and they, oftentimes, in the midst of his greatest difficulties, were obscured. To navigate in such circumstances would be similar to walking with the eyes shut; it was natural for him, therefore, to cling to the coast, and scarcely venture off from the earth by night. But, after awhile, in addition to the motions of the sun and moon, it had been observed that certain stars towards the north never sunk below the horizon, but seemed to move continually round a definite point. The ancient Greeks noticed the constant revolution of the seven conspicuous stars, forming the hinder part of the Great Bear; but it appears that the commercial Phœnicians had already more closely tracked up the northern point of the sky by directing their attention to a set of stars, which kept on revolving in smaller circles than those observed by the Greeks. This was the constellation called the Little Bear; at the tip of the tail of which animal is situated a star, now called the Pole Star. This is the nearest plainly visible star to that point which is in a line with the pole of the earth, infinitely extended northward. When the use of these observations had been made familiar by practice, the nautical art advanced considerably, and various schemes of enterprise were formed, and effected with more or less

It has been well observed that it is a distinctive feature

* See *Saturday Magazine*, Vol. III., p. 115.

in modern Navigation, as compared with that of the ancients that the method of conducting a ship now from place to place, as depending upon definite and distinct rules, is much more safe and simple, and requires, perhaps, less training and study, while it effects much more than the method of the ancients. The naval officers particularly offering themselves to our notice by their official variation from the moderns, are the master of the rowers, and the pilot. It was the business of the former to attend to the rowing department of the vessel, to assign their places to the rowers, to encourage them in their labours, and to keep time to the motion of the oars, by the strokes of his mallet, or the musical intonations of his voice. The other officer, who especially claims our attention, is the pilot, or master of the ship; to whom belonged the duty of navigating the vessel, and who was consequently responsible for the safety of the ship, and all on board. His place was at the stern; and to excel in his vocation, he had to possess an exact knowledge of his art, which consisted chiefly in skill in steering, in managing the sails, and in the use of other nautical appurtenances, together with a knowledge and experience of the winds, of the heavenly bodies, as indicating the seasons, portending the weather, and directing the course of the ship, and of the site of commodious ports and harbours; when rocks and quicksands were to be dreaded, and how they might be avoided. The ancients retired into harbour when they saw the Winter signs begin to rise; where they remained till the constellations of Spring invited them upon the waters. It was not usual, therefore, for them to prosecute their voyages long after the Autumnal Equinox. The gales which then prevailed in the Mediterranean, formerly called Euroclydons *, or Tuffoones †, but now *Levanters*, or *Michaelmas flows*, being hazardous to shipping, made them lie by for the Winter. The necessity of this is alluded to in Acts xxvii. 9. The Jewish fast of expiation, which is there meant, was on the 25th of September. It was also necessary for the pilot to understand and explain the signs and prognostics which offered themselves from the sea-birds, the fishes, the surge, the billows dashing upon the shore, and the waving of the woods on the impending heights. A seaman, unapt in the solution of any novelty of this sort, could not attain to the reputation of a good pilot.

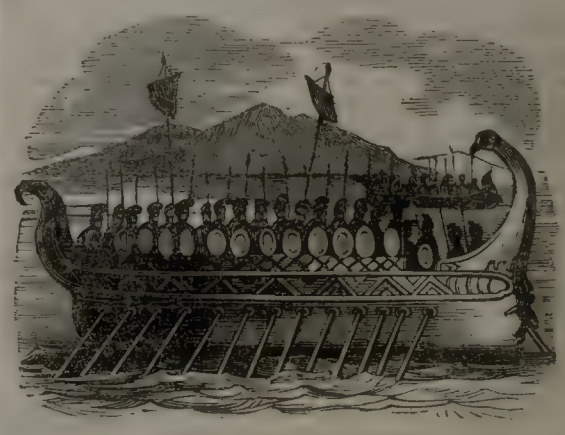
It was also expected that this personage should have procured an ample supply of favourable winds; as the Lapplander captain of our times buys of the wise women a quantity of this necessary material for navigation. We are told that Ulysses, having procured a bag of wind, was returning home to Ithaca with a prosperous sail. When his native isle was just in sight, and the hero had fallen asleep through fatigue, the bag was opened by the sailors, who suspected that treasure was concealed in it: whereupon the winds rushed forth with awful violence, and drove the ship backward a distance of ten days' sail.

At the termination of a voyage, the vessels were usually stranded by urging them stern foremost towards the land, when the crews drew them up out of the water by main force.

The notion of light-houses seems to have been generally adopted about the time of the Christian era from the Egyptians. The small island of Pharos, in the bay of Alexandria, had been joined to the continent by a causeway of a mile in length, about 284 B.C. At the extremity of this mole was built a white marble tower, at the top of which a fire was kept constantly burning, visible, we are told, at the distance of one hundred miles; but this would make it to have been somewhat more than a mile in height from the surface of the earth, unless, indeed, it were visible from some eminence a hundred miles distant. This part of the account seems apocryphal, and even the site of the celebrated Pharos is a matter of dispute. The pride of man has doubtlessly exaggerated the facts of many ancient narratives; and from this, perhaps, as well as from many other classical stories, we must make considerable deduction but, at any rate, we have accounts of various erections of this nature, and they seem at the later period of ancient navigation to have been not uncommon, when ample experience had made nocturnal sailing less formidable. We find them accordingly erected at most of the harbours and naval stations which ships frequented; places where nature had been assisted by art, and where the larger-sized ships rode at anchor, secure from the swell of the seas around.

The ancients generally, as well as the barbarians of modern times, carried their idols with them on a voyage, thinking thereby to ensure the safety of the ship. Vows, therefore, which had been made previously to, or during the voyage, were now discharged, and especially was due reverence paid to Neptune, whose peculiar dominion they had just safely left. Those who had landed in safety after a storm, or any other of the manifold hazards of a sea-voyage, hung up in one of the numerous temples surrounding the port, a picture of their disaster, together with the garments in which they had escaped it. This, with a multitude of other Pagan customs, has been exploded by time in most of the countries of the world; but we learn that this act of piety is still practised on the coasts of the Mediterranean, where the people profess the Roman Catholic faith. Happy would it have been for the human race, if no heathen custom more questionable than this, had received the sanction of the teachers of Christianity in the ages succeeding the times of the Apostles!

ANCIENT FLOATING TOWER.



ANCIENT ROMAN WAR GALLEY.

* A billow-excitin east wind. † A whirlwind.

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THE STORY OF

MASANIELLO, THE FISHERMAN, AND THE REVOLUTION OF NAPLES.

THE LAZZARONI OF NAPLES.

PART THE FIRST.

THERE are few kingdoms in Europe which have undergone so many vicissitudes as that of Naples; and the chief source of its calamitous changes was the preposterous claims of the popes to dispose at their pleasure of the crown. After the overthrow of the Hohenstauffen, a dynasty remarkable for its uncompromising hostility to the papal usurpations, the sovereignty of Naples was bestowed upon the house of Anjou; but this French race of princes soon became unpopular, and after many changes and convulsions, the Neapolitan dominions were annexed to the kingdom of Spain, then rapidly rising into the foremost rank of European states. It remained quietly subject to Spain for nearly 150 years, until in the year 1647, a poor fisherman raised a revolt, which entailed upon it additional misery. The history of this extraordinary revolution is so very interesting, and so very instructive, that we shall relate it at full length, especially as some of the most important details have been hitherto hidden from English readers. To understand the causes of the revolution, it will be necessary to give a preliminary sketch of the Spanish tyranny over the Neapolitans.

When Spain first acquired dominion over Naples, the latter country, notwithstanding recent wars, was wealthy and populous; and its position afforded a reasonable prospect of increasing prosperity, for it possessed the finest ports in the Western Mediterranean, then the great high-road of commerce. Spain, on the other hand, was exhausted by long wars against the Moors, the recent discovery of America had seduced a large portion of the population to emigrate to the new countries, and the gold and silver imported from Mexico and Peru did not compensate for the abstraction of cultivation from the land, the emigration of the most industrious, and the consequent cessation of domestic improvement. Under these circumstances the Spanish government regarded its Neapolitan territory as a kind of reserved treasury by which all the pecuniary deficiences of Spain might be supplied and the chief object of their administration was to drain as much money from their Italian subjects, as they could obtain by fair means or by foul. Naples, of course, was governed by viceroys; the only object contemplated in the selection of these officers was their skill in extortion, and if they sent home money in plenty, no objection was made to any

acts of tyranny or rapacity in which they might please to indulge on their own account. The fertility and opulence of the Neapolitan dominions would have enabled them to bear very heavy exactions, but the more the Spaniards obtained, the more they desired, and the very ease with which existing taxes were paid, became an excuse and encouragement for fresh impositions. Thus matters proceeded, until, as an Italian historian justly remarked. "The secret fires of Vesuvius were not so numerous, nor so dangerous, as the revengeful flames which burned in the bosoms of the Neapolitan populace."

During the reigns of Philip the Third and Philip the Fourth of Spain, the sufferings of the Neapolitans were aggravated by the custom which prevailed of farming the taxes. The Genoese brokers, who purchased them from the King of Spain, extorted profit in every shape and way, from the unfortunate peasant and artisan, and when profits no longer supplied their rapacity, compelled the unfortunate victims of their rapacity to yield up their little capital. Under such a system it is not wonderful that the wealth of Naples at length became exhausted; and when the Admiral of Castile, the ruling viceroy, demanded a subsidy from the assembled estates, he received a refusal which he was convinced arose from absolute poverty. He wrote to Philip the Fourth, that Naples in its present exhausted state, could not meet the new demand; he received in reply, peremptory orders to exact the subsidy, but the gallant admiral refused to become the agent of oppression, and immediately resigned the government.

This excellent nobleman was succeeded by the Duke of Arcos, a man of a very opposite character. Like most Spaniards, he was haughty, vindictive, and obstinate, but unlike his countrymen, he was crafty and treacherous. He had not been long in office, when the French, then at war with Spain, sent out a fleet which threatened to invade Naples, and consequently forced the viceroy to prepare an armament for the protection of his province. The practice of that day in such an emergency, was to borrow the amount of the parliamentary grant from some capitalist, to whom a branch of the public revenue was mortgaged for the interest and repayment of the loan, and who generally derived an exorbitant profit from the transaction. Such was the general opinion of the Neapolitan resources, that a lender and money were easily found, but such, also, was the exhaustion of the country, that the viceroy's council were at their wits' end to devise an impost for its repayment. At length it was proposed by Andrea Nauclerio, the provost of the merchants, to levy a tax of one carlin per pound, on all the fruits and vegetables which were brought to market, and which then, as now, formed the principal articles of food to the lower classes at Naples. The proposition was adopted, and an edict for its enforcement issued on the 3rd of January, 1647.

This tax was by no means a new invention; several viceroys had already attempted to establish it, but had finally abandoned the scheme, from a conviction of its odious and oppressive nature. The Duke of Arcos, however, was deaf to all remonstrances, and he even accused those counsellors of treason, who ventured to remind him of the homely proverb, that "Hunger will break through stone walls." Scarcely was the edict published, when loud murmurs were heard throughout the entire city of Naples. It is a city in which a large vagrant body, called the Lazzaroni, accustomed to support life at a very trifling expense, support themselves by chance jobs, because a trifling remuneration, less than Englishmen frequently bestow in alms, enables them to live in the luxury of indolence. On this numerous and dangerous class the tax pressed with enormous severity; to use their own expression, recorded by a contemporary writer, "it took the food out of their very mouths." Acts of violence succeeded to their disregarded murmurs; the viceroy could not appear abroad without being subjected to seditious clamours, and even personal insults; insurrectionary placards were posted in the market-place; and the booth erected for the collection of the tax was burned to the ground. Arcos at length, greatly alarmed, summoned his council, and went through the mockery of deliberation; but every other source of revenue was pledged and mortgaged to the outside of its value, money was to be raised at all hazards, and, of course, the consultations ended in ordering the continuance of the tax. Some efforts were made to punish those who publicly testified their dissatisfaction; but this only increased the number of secret conspirators, and the viceroy soon received an alarming warning of the perils by which he was environed. A Spanish flotilla lay in the Bay of Naples, the admiral's galley was remarkable for its strength and beauty, and 300,000 ducats were placed on board her for transmission to Spain. On the night of the 12th of May, she was discovered to be on fire, and ere means could be taken to save her, she blew up with all her treasure, and a portion of her crew. There was not one who saw the spectacle that did not feel convinced that it was the work of treachery, and the viceroy felt so much alarmed, that though he was pre-eminently superstitious, he forbade the annual procession on the 24th of June, in honour of John the Baptist, lest the collection of a multitude should lead to a sudden outbreak of insurrection.

Among those who exclaimed most bitterly against the fruit tax, was Tomasso Aniello, better known by the abbreviation Mas-aniello, whose destiny it was to experience more rapid changes of condition in the ensuing troubles, than any mortal ever underwent in the same space of time. He was a handsome, light-built, active, young man, not more than twenty-four years of age, but already recognised as a leader among his associates, from his readiness of wit, and great personal activity in the manly sports which delight the fishermen of Naples. His wife was detected by the tax collectors concealing a bag of flour, to evade the duty; she was grossly insulted and dragged to prison. The rest of the history must now assume the form of a journal, that our readers may the better appreciate the rapidity with which events followed each other.

July 7, 1647. This was the second Sunday before the feast of our lady of Carmel, one of the festivals celebrated by the superstitious Neapolitans with circumstances of peculiar solemnity. Among other amusements, it was customary to erect a wooden fortress, which the fishermen defended disguised as Turks, while the Lazzaroni attacked it in their ordinary habiliments. So popular was this spectacle, that it was always rehearsed on the three preceding Sundays; on the Sunday of which we speak, Masaniello, who had been chosen leader of one of the parties, assembled a crowd of boys and young persons, at a very early hour, to practise their parts in the performance. It so happened that this was also a great market-day, and crowds of peasants from the neighbouring districts had come in with fruit and vegetables for sale. Either on account of the superabundant supply, or the engagement of the multitude in their sports, the market was very heavy, and purchasers could not be found for the articles. The fiscal officers insisted that the tax should be paid on

everything, whether it was sold or not; but it still remained to be decided whether the tax should be paid by the peasants or by the hucksters. The dispute was referred to Nauclerio, the provost of the merchants, whom we have already mentioned as the proposer of the obnoxious impost, and he decided that the tax should be paid by those who brought the fruit to market. Masaniello's brother-in-law, a hard-working peasant from Pozzeroli, was one of the persons aggrieved by this decision; he exclaimed against the injustice of being compelled to pay for articles which had as yet produced him no profit, and his loud tones soon attracted the notice of Masaniello and his companions. They hurried into the market-place, and the peasant, now sure of support, ventured to give free scope to his indignation, by throwing about the figs, which had been the original cause of the dispute, crying out, "Take these who will, our tyrants shall have none of them!" In an instant, Masaniello, who stood by his side, seized a bunch of figs, and flinging it violently into Nauclerio's face, exclaimed, "Let them take this at the least!" This was the signal for a general riot, missiles of every description were flung at the tax-gatherers and their attendants, one act of violence led to another, the toll-bars were torn down, the booths of the collectors burned, and in a very few minutes the market-place was at the mercy of an infuriate populace. Masaniello seized the opportunity of addressing his companions, indignation prompted his eloquence, and though he had no advantages of education, his harangue was one well calculated to ensure the support of the mob. He pointed out to his hearers the dangers they had already incurred by provoking the vengeance of the Spaniards, he declared that this was the crisis of their country's fate, he conjured them to stand by him, and promised in the strongest terms a redress of all the grievances of which they had to complain.

Such, indeed, are the topics always used by a demagogue to inflame a multitude; but Masaniello was not an orator who traded on excitement, it was a mere accident which elevated him to be the author and leader of a movement. But his career fully proved the perils that arise from stimulating the passions of the ignorant, and added one to the many proofs which history affords of the impossibility of correcting evils by an appeal to physical force, without producing calamities infinitely greater than the oppressions which led to the insurrection.

Goaded onwards by the fiery harangue of Masaniello, the mob rushed from the market-place; some armed themselves with their ordinary implements of industry, others broke open the shops of the gunsmiths and seized the weapons they contained; the houses of the farmers of taxes were broken open, shots were fired into the houses of persons supposed to be favourable to the Spaniards, and many took the opportunity of revenging private quarrels under pretence of zeal for the public cause. At first the insurgents abstained from plunder, but in this as in countless other instances, the vehemence of patriotism was soon unable to restrain the lust of pillage; the women who had joined the rioters, gave the example of pilfering, which soon extended into a regular system of robbery.

As yet the insurgents had no acknowledged leader; like all vulgar rioters they wished to have a member of the aristocracy, and accidentally meeting the Prince of Bisignano, they compelled him to act as their chief. But though the Neapolitan nobles were justly indignant at the tyranny of the Spanish viceroy, they were too wise to countenance the outbreak of the populace; they knew full well that a mob, after having used the nobles, whom deluded ambition has led to participate in their efforts, must eventually yield to the natural jealousy with which the lower orders regard their superiors and fling them away as broken tools, too fine and too weak to execute the rough work required by an imperious democracy. Shocked at the excesses he was compelled to witness, the Prince took the earliest opportunity of escape, while the confused masses spread over the city, began to direct their forces on one common centre and move towards the viceroy's palace.

The viceregal guards made a faint effort to resist the popular current, but they were soon overcome, and a body of the rioters forcing their way into the viceroy's presence, imperiously demanded not only the abolition of the obnoxious impost on fruit, but of all other taxes and impositions whatever. Terrified by violence, destitute of any force on which he could rely, and perceiving that the popular excitement increased every hour, the Duke of Arcos readily assented to every demand; but his compliance did not allay the tumult, the mob began to destroy his most valuable furniture, and did not abstain from personal violence. He attempted to escape in a coach, but was detected, abused, threatened and struck; by flinging money among the mob, he diverted their attention for a moment, and while they were eagerly engaged in a scramble, he succeeded in making his escape.

After his departure, the moo proclaimed Masaniello "Captain General of the faithful people of Naples," he who had been an humble fisherman in the morning, was an absolute sovereign ere the night closed in. He nominated a council composed of the lowest and most infamous of the rioters, but, in the true spirit of a low democrat, flushed by temporary power, he did not permit his fellow rebels to deliberate on his orders; indeed he would scarcely deign to listen to their advice

Even at this early stage of the revolution, symptoms were perceptible of the insanity to which Masaniello ultimately fell a victim, and which was necessarily ripened by the excitement of the strange circumstances in which he found himself placed. He made the tower of the Carmelites his head-quarters, and there, while his council talked rather than deliberated, he stood in moody silence, warming his hands over a chafing-dish of coals. The only answer he made to repeated inquiries was, "I feel a burning and a heaviness as if my brain were overflowed by molten lead; but the Blessed Virgin and the Holy Saints appear to me every night, and promise me their assistance and protection. I have promised freedom to the people and they shall be free, yes I promise it, I swear it, they shall be free." This and similar broken speeches were uttered with maniac vehemence, which made them pass with his deluded votaries for words of inspiration. They unhesitatingly obeyed his orders to break open all the prisons, and liberate the captives; they massacred the few inhabitants who ventured to resist, and they set fire to the mansions of several obnoxious individuals. One of the houses which became the prey of the incendiaries, contained a large quantity of gun-powder, it was blown up, and eighty seven persons lost their lives. Sunday night was spent sleeplessly by the population of Naples; the flames of burning houses lighted every quarter of the city; the shrieks of the wounded and the lamentations of the relatives of the slain were heard in every street, save where the imperious insurgents forcibly compelled silence.

HISTORY OF THE OLIVE TREE, AND THE MODE OF PREPARING THE OIL.

No. I

THE Olive-tree (*Olea Europæa,*) came originally from Asia, and grows abundantly about Aleppo and Lebanon. It is naturalized in many parts of Southern Europe, being found in woods and hedges, and in this wild state produces a small fruit of no value. When cultivated, however, it becomes one of the richest productions of the South.

It is an evergreen tree, with thick and leathery leaves, well calculated to resist the action of water, as they once did for the space of two hundred and seventy-one days; the period that elapsed from the day on which "the fountains of the great deep were broken up," until the evening when the dove came in to Noah, "and lo! in her mouth was an Olive-leaf pluckt off." And ever since, in all ages and countries, wherever this tree is known, has its branch been the favourite emblem of peace. The same chapter of Genesis also illustrates the locality of the Olive. The ark had rested on Mount Ararat one hundred and fourteen days, and the tops of the mountains had been seen forty days, yet when Noah sent forth the dove the first time, it returned, finding "no rest for the sole of her foot;" and it was not until seven more days had passed that the waters had retired from the plains, valleys, and rocky ravines where the dove is accustomed to seek its food, and in which the Olive delights to grow. The flowers are delicately small and white, are very numerous, and fall off in showers when the tree is shaken; so Eliphaz, upbraiding Job for his sins and misfortunes, and alluding to the loss of his children, says, "The wicked man shall shake off his unripe grape as the vine, and shall cast off his flower as the Olive." (Job xv. 33.) The oval fruit has a delicate light-blue bloom upon it, but when this is rubbed off, is of a deep purple colour, shines, and has lost its beauty.

To an English eye this tree has, at first sight, no striking characteristic of beauty. Its height, which rarely exceeds thirty feet, creates no idea of grandeur, which in countries like England, that abound with lofty forest trees, is considered one of, if not the chief, element of beauty in trees. Again, it has a most sober hue that ill agrees with our preconceived notions of the golden tints of southern foliage; hence those, who in the rapidity of travelling glance at it with a careless eye, are generally disappointed, and hence it is almost universally compared with our own willow. Southey speaks of its "willowy foliage," but the points of resemblance are not sufficiently well marked to justify the comparison of an Olive-grove with an ozier-holt. It is true that both trees are of about equal height, and have the under surface of their leaves of a lighter colour than the upper, which is very beautiful when their branches are turned or lifted by the wind. The cultivated Olive, too, is pollarded or deprived of some of its branches in order to develop the young wood; but as the fruit is the object and not merely the wood, as is the case with the willow, its branches are never destroyed year after year, and, consequently, it never has the unsightly appearance that that tree has when deprived of all its foliage. The poet Virgil *contrasts* the Olive with the willow. Making a shepherd praise one man at the expense of another, he says, "You are as much superior to him, as the dusky willow yields in beauty to the pale Olive." But it has charms superior, not only to the willow, but to most other trees. If the eye is not attracted towards it at first by any striking beauty, there are few natural objects that improve so much upon acquaintance. The more you see it, the more its graceful form and quiet beauty wins your admiration. It appears to greatest advantage in rocky situations, in the country round Athens for example, where an absence of general vegetation, during the warmer months, produces a beautiful contrast between the naked and burning rocks and the luxurious Olive-groves of the lower lands. A more beautiful scene can hardly be imagined than that from the Acropolis, a rocky fortress that rises abruptly on the south side of the city: standing within the portico of its Parthenon, you look down upon Mars' Hill, where St. Paul declared unto the superstitious Greeks the unknown God whom they ignorantly worshipped; beyond is the scarcely less famous pulpit of Themistocles, but it is to the plain to which the eye flies for relief, for—

> See there the Olive-grove of Academe
> Plato's retirement.

Previous to the late revolution, this grove extended from the walls of the city to the sea; but during the war, 20,000 trees were burnt, and many an old tree may now be seen reduced to charcoal on one side, yet retaining its vitality on the other. The annexed figure represents one that had actually been burnt into two separate trees, resting against each other for mutual support, yet loaded with fruit at the time the sketch was taken. Some of these were purposely destroyed by the enemy, and some were cut for firewood. The facility with which this tree takes fire, even when standing in the green state, was not unknown to the ancients, and is thus noticed by Virgil:—

> Sparkling fire from hind's unwary hands
> Is often scattered o'er their unctuous rinds,
> And after spread abroad by raging winds:
> For first the smould'ring flame the trunk receives,
> Ascending thence, it crackles in the leaves,
> At length victorious to the top aspires,
> Involving all the wood in smoky fires.
>
> DRYDEN'S *Virg. Georgics.* II.

Since the peace, many thousand trees have been destroyed by floods. Drainage has been neglected, and the water stood for months upon the roots, and eventually killed the trees. A burning sun acting upon this mass of decayed vegetable matter, generated one of the most dreadful fevers that ever visited Athens. It paralysed the whole population; for two seasons there was scarcely an indication of exertion to cultivate the soil. In the suburbs, where scraps of land are generally so precious, there were no gardens; a few fig-trees and a solitary palm, which the war had spared, were almost the only

remnants of former industry: but the Government, in 1835, had succeeded in draining the whole of the neighbouring country, and the Olive-grove of Athens was rapidly recovering from its losses by fire and water.

A volume might be written upon the *historical associations of the Olive*. It is frequently mentioned in the Bible both in its cultivated and wild state. The promised land abounded with Olives, it was "a land of Oil, olive, and honey." It was cultivated by kings as well as by their subjects. David set officers over his "Olive-trees in the low plains," "and over the cellars of oil." (1 Chron. xxvii. 28.) To be deprived of it, was one of the temporal punishments of the disobedient Israelites. "Thou shalt have Olive-trees throughout all thy coast, but thou shalt not anoint thyself with the oil: for thine Olive shall cast his fruit." (Deut. xxviii. 40.) And Samuel, speaking of the oppressions of a king, says, "He will take your Olive-yards, even the best of them, and give them to his servants." (1 Sam. viii. 14.)

We can trace the custom of using Olive-oil in religious ceremonies to the highest antiquity. Jacob poured it upon the pillar that he set up in Beth-el. (Gen. xxviii. 18.) The holy anointing oil of the temple was Olive-oil, scented with myrrh, cinnamon, sweet calamus and cassia.

The Mount of Olives is consecrated to us by the holiest associations. At the foot of the Mount, over the brook Cedron, is the Garden of Gethsemane, and according to Major Skinner, one of the latest travellers in the East, it abounds at the present day with exceedingly old Olive-trees. To this garden, "Jesus ofttimes resorted with his disciples." It was the scene of his prayer, of his agony, and betrayal. In one of her beautiful sonnets, Mrs. Hemans has adverted to the awful circumstances connected with this spot.

The palm—the vine—the cedar—each hath power
To bid fair oriental shapes glance by,
And each quick glistening of the laurel bower
Wafts Grecian images o'er fancy's eye:
But thou, pale Olive! in *thy* branches lie
Far deeper spells than prophet-grove of old
Might e'er enshrine:—I could not hear thee sigh
To the wind's faintest whisper, nor behold
One shiver of thy leaves dim silvery green,
Without high thoughts and solemn, of that scene
When, in the Garden, the Redeemer prayed—
When pale stars looked upon his fainting head,
And angels ministering in silent dread
Trembled, perchance, within thy trembling shade.

This tree was a great favourite with the ancient Greeks. They held it in such esteem, that the Athenians imagined that Minerva, the patron goddess of their city, created it peculiarly for them:—a superstition which arose from the crafty policy so eminently characteristic of their nation. In the time of Themistocles, some of the nobles, for the purpose of opposing his views, which were directed towards making them a maritime and warlike nation, and to induce the ignorant multitude to turn their attention more to agriculture, invented the fable of a contention between Minerva and Neptune for the honour of protecting the city of Athens. The assembly of the gods promised the preference to whichever of the two gave the most necessary and useful present to the inhabitants of the earth. Neptune, upon this, struck the ground with his trident, and immediately a horse issued from the earth. Minerva produced the Olive, and obtained the victory by the unanimous voice of the gods, who observed, that the Olive, which is the emblem of peace, is far preferable to the horse, which is the symbol of war and bloodshed. When in the island of Teaki, the ancient Ithaca, the writer saw an antique seal upon which, in allusion to the above fable, Minerva was represented standing in a very graceful attitude, resting her right hand upon her young Olive-tree. It was found in that island, and was in the possession of Signor Marco Zavò, an Ithacan merchant of noble family, whose house is ever open to English travellers, and as there is no hotel in the island, his hospitality is not infrequently taxed. The figure is an enlarged representation of an impression from the seal.

As sacred history made the Olive emblematic of peace, so, from its great value to man, has it been universally considered the symbol of plenty. As such we find it on the coins of those countries of which it is not a native; our own Britannia holds in her right hand the Olive-branch of peace and plenty.

Scarcely an ancient custom existed in Greece with which we do not find this tree, in some way, associated. The wild Olive was never used on these occasions, but there were plantations sacred to their religious rites and festivities; and it was sacrilege to use them for any other purpose. A law existed, "if any one plucks up the sacred Olive-trees at Athens, beside the two yearly allowed at the public festivals and funerals, he shall pay one hundred drachms (3*l.* 4*s.* 7*d.*,) for every one unlawfully pulled up, the tenth part of which fine shall be due to Minerva."

The victors at the Olympic games were crowned with wreaths of a peculiar variety of the Olive, which was brought by Hercules (so fable will have it,) from the Scythians, and planted near Olympia, where it flourished. It was called Callistephanos, that is, *fit for crowns*; and it was forbidden, under a great penalty, to cut it for any other use. Games, similar to these were revived at Athens in 1835, and Otho, the amiable young King of Greece, crowned the victors with wreaths of Olives.

In all festivals in which Minerva was concerned, we find the Olive used as believed to be most acceptable to her. At the lesser Panathenæa, an Athenian festival in honour of her, the conqueror at the games then held, was rewarded with a vessel of Olive-oil, which he was permitted to dispose of how and where he pleased, whereas it was unlawful for any other to transport that commodity: further, he received a crown of those Olives which grew in the Academy and were sacred to Minerva.

At their marriages every part of the bridegroom's house, and more particularly the door, was decorated with flowers and boughs upon the nuptial day. Plutarch says that the Olive was more particularly used for this purpose. The same custom is seen, at the present day, both in private and public rejoicings. When the king of Bavaria, the father of Otho the First, paid a visit to his son, there was scarcely a door-post in the streets of Athens through which he passed that was not covered with myrtle and Olive-boughs.

At the ancient funerals the body, after being washed was anointed with Olive-oil; cups of oil, together with incense, were thrown upon the burning pile, and the priests at the end of the ceremony

> .....dipped an Olive-branch in holy dew,
> Which thrice he sprinkled round; and thrice aloud
> Invoked the dead, and then dismissed the crowd.

It was a privilege of the citizens to use the oil in the schools of exercise, for one of the laws relating to these schools was, that "no slave shall presume to anoint." In the ancient baths there was a room for the purpose of anointing with oil, to close the pores of the body after the use of the hot baths, and to prevent the skin from becoming rough after the water was dried off. Pliny says that, at the time of the Trojan war, they had no better unguent than common olive oil perfumed with odoriferous herbs, especially roses. It was considered effeminate for the men to use even this, and, at a much later period, the Greek virgins were not allowed to anoint themselves with any odorous unguent, but used simple olive oil. Minerva and Diana are represented as rejecting perfumed oils. Solon made a law that "no man shall sell perfumes;" but Socrates was of opinion that it was decent enough for women to smell of perfumed unguents, but that men should rather smell of oil, an opinion which the modern Greeks seem very generally to have retained, and actual contact is unnecessary to detect their partiality for it.

The Olive-tree was scarcely less a favourite with the Romans, although it was not held in the same sacred light as amongst the Greeks; the ivy and the vine in some measure superseding its use. Their garden-god, however, was adorned with it; this god, usually cut out of the trunk of some old tree, was crowned with various wreaths peculiar to each season. In spring, it was decorated with flowers, with corn in summer, with the vine in autumn, and with the Olive in winter, the most appropriate season for it, as at any other period either the flowers or fruit would be destroyed. In a poem ascribed to Catullus, this rustic god is represented as saying—

> Soon as the vernal season smiles,
> I'm gaily crowned with flowery spoils;
> But yellow wreaths of ripened corn,
> 'Mid summer heat, my brows adorn;
> The luscious vine's thick branches spread
> In blushing autumn round my head;
> And, when cold blows the wintry winds,
> My temples pale-green Olive binds.

The Romans, ever superstitious, were in nothing more so than the uses to which they religiously applied certain woods, some of which they called "fortunate," others "unfortunate." When they burnt anything bad or ill-omened, they made use of such unfortunate trees that were under the protection of the infernal gods, as the holly and all kinds of thorny shrubs; on the other hand, the Olive, fig, pear, and apple trees, and the vine, and many other trees, that were valuable for their productions, they used on joyous and fortunate events. The wild Olive, as being unproductive and useless, was classed with the former, and the cultivated with the latter.

The oil was more used in their toilet than in that of the Greeks. Catullus, accusing some luxurious Latin youth of effeminacy, says, that his couch was "fragrant with chaplets of flowers and perfumed with the Syrian Olive oil." Any one would suppose that oil of a superior quality was, at that period, an article of commerce between Syria and Italy; but any rich odour was termed Syrian with the Romans, and in this case with great propriety, as the Olive came originally from that part of Asia.

EASY LESSONS ON CHRISTIAN EVIDENCES.

No. XIV.

MODERN JEWS. PART II.

IT is likely that when Jerusalem and its Temple were destroyed, several of the Jews who had till then rejected the Gospel, may have been at length converted, by the strong additional evidence which was thus afforded. They saw the heavy judgment that fell on their nation; and that it was such as to make the observance of their law impossible. They saw, also, that the event agreed with what Jesus had predicted forty years before. And they saw, too, that those of his followers who had been living in Jerusalem, had been enabled to escape destruction by following his directions, and fleeing to the mountains as soon as they saw Jerusalem encompassed by an army. It is, therefore, likely that several may have been led by this additional evidence to embrace the Christian faith. But of this we have no records; as the book of Acts takes in only an earlier period. And in that book we have no particulars of the numbers of those Jews who were converted; though it appears they must have amounted to many thousands, indeed, many myriads; that is, tens of thousands; as is said in the original Greek of Acts xxi. 20. But still these made but a small portion only of that great nation. And as the Jewish Christians would soon become mingled with the Gentile Christians, and cease to be a separate people, hence, all those who are known as Jews at this day, are the descendants of those who rejected the Gospel.

They are computed to amount, at the present time, notwithstanding the prodigious slaughter of them, at the taking of their city, and on several other occasions, to no less a number than 4,800,000, scattered through various parts of the world; everywhere mixing and trading with other nations; but everywhere kept distinct from them by their peculiar faith and religious observances. And everywhere they preserve and read with the utmost reverence their sacred books which foretell the coming of the Messiah, or Christ, at a time which (by their own computations) is long since past, namely, about the time when Jesus did appear. Their books foretell, also, such judgments as their nation is suffering; and foretell, too, what is most remarkable, that notwithstanding all this they shall still remain a separate people, unmixed with the other nations.

You should observe, too, that these prophecies are such as no one would ever have made by guess. Nothing could have been more unlikely than the events which have befallen the Jewish nation. Nothing like them has ever been foretold of any other nation; or has ever happened to any other. There are, indeed, many cases recorded in history, of one nation conquering another, and either driving them out of the country, or keeping them in subjection. But in all these cases, the conquered people who have lost their country, either settle themselves in some other land, or if they are wholly dispersed, generally become gradually mixed and blended with other nations; as, for example, the Britons and Saxons, and Danes and Normans, have been mixed up into one people in England.

The only people who at all resemble the Jews in having been widely dispersed and yet remaining distinct, are the people commonly called Gipsies, and whose proper name is Zinganies, Jinganies. It has been made out that they are an East-Indian nation, speaking a Hindoo dialect. And they are widely scattered through the world, keeping up their language and some customs of their own, in all the countries

through which they wander. They are certainly a very remarkable people; and if there had been any prophecy (which there was not,) of their being thus dispersed, we might well have believed that such a prophecy must have come from inspiration.

But in some remarkable points their condition differs from that of the Jews, and is less unaccountable.

First, they do not (like the Jews) live in towns among other men, and in houses; but dwell in tents, by the road-sides, and on commons; leading the life of strolling tinkers, pedlars, and fortune-tellers. This roaming life, of course, tends to keep them separate from the people of the countries in which they are found.

But the chief difference is, that the Gipsies are always ready, when required, to profess the religion of the country, whether Christian or Mohammedan, or any other; seeming to have no religion of their own, and to be quite indifferent on the subject. The Jews, on the contrary, always, when they are allowed, settle in towns along with other men; and are kept distinct from them by their religion, and by nothing else. They are the only people who are everywhere separated from the people of the country in which they live, entirely by their peculiar faith and religious observances; and *that*, too, though their religion is such (which is the strongest point of all) that the most important part of its ordinances,—the sacrifices ordained in their law,—*cannot* be observed by them.

The Jews, therefore, in their present condition, are a kind of standing miracle; being a monument of the wonderful fulfilment of the most extraordinary prophecies that were ever delivered; which prophecies they themselves preserve and bear witness to, though they shut their eyes to the fulfilment of them. No other account than this of the present state and past history of the Jews ever has been, or can be given, that is not open to objections greater than all the objections put together that have ever been brought against Christianity.

This, then, as well as several other difficulties in our religion, such as have been formerly mentioned, will be found, on examination, to be,—even when you cannot fully explain them,—not so much objections against the truth of your religion, as confirmations of it.

And when you do meet with any objection which you are at a loss to answer, you should remember, (as has been above said,) that there are many things which all men must believe, in spite of real difficulties which they cannot explain, when there are much greater difficulties on the opposite side, and when sufficient proof has been offered.

And in the present case, you have seen that it is not only difficult, but impossible, to account for the rise and prevalence of the Christian religion, supposing it not to have come from God. It certainly was introduced and propagated (which no other religion ever was) by an appeal to the evidence of miracles. Nothing but the display of supernatural powers could have gained even a hearing for the Apostles; surrounded as they were by adversaries prejudiced against their religion by their early education and habits of thought, and inclinations, and hopes. And these supernatural powers were, as you have seen, acknowledged at the time by those adversaries; who were driven to attribute the Christian miracles to magic arts.

And you have seen, too, that the religion itself, and the character of Jesus Christ as drawn in the Christian Scriptures, and the whole of the narrative of those books, are quite different, and, indeed, opposite to what might have been expected from impostors or enthusiasts.

And lastly, you have seen that many of the difficulties that have been brought as objections against Christianity, turn out, on careful inquiry, to be an additional evidence of its truth.

Among others, this is remarkably the case with the difficulties relating to the history and condition of the Jewish nation. Though you may not be able fully to explain all the circumstances relating to that wonderful People, you may learn from them, what they refuse to learn from themselves; a strong proof of the truth both of their Scriptures, and of the Gospel which they obstinately reject. It is so ordered by Providence that even that very obstinacy is made to furnish an additional proof of Christianity; by setting them forth before all the world as a monument of fulfilled prophecy.

There are several other instructions and warnings, also, which you may learn from attentively reflecting on the case of the Jews: and I will conclude by shortly mentioning a few of these.

First, you should remember that when you see the Jews, both formerly, and now, obstinately keeping to the faith of their forefathers, merely because it is what they were brought up in, and refusing to listen to any reasoning on the subject of religion, a Christian has no right to wonder at, or to blame, them, if he does the same thing himself; that is, if he is satisfied to take upon trust whatever he may have been told, and is resolved neither to seek nor to listen to any arguments that may enable him "to give a reason of the hope that is in him." And the same may be said of Mohammedans and Pagans, as well as of Jews. Though the Christian happens to have a religion that is right, *he* is not more right than they, if he goes on the same plan that they do. At least, he is right only by chance, if he holds a faith that is true, not *because* it is true, but merely because it is that of his forefathers.

Secondly,—You should remember that we are apt to make much less allowance for the unbelieving Jews than for Christians who lead an unchristian life; and that we *ought* to do just the contrary.

It is difficult for us, of these days, to understand and fully enter into the great difficulty which the Jews had (and still have), in overcoming all the prejudices they had been brought up in, and which were so flattering to their own nation, as God's favoured People. It was a hard task for them to wean themselves from all the hopes and expectations of temporal glory and distinction to that nation; hopes which they and their ancestors had cherished for so many ages. No doubt it was a grievous sin in them to give way to those prejudices, and to reject the Christ as they did. But it is a greater sin to acknowledge Him, as some Christians do, as their Lord and Master, and to "believe that He shall come to be our judge," and at the same time, to take no care to obey his precepts, and copy the pattern of his life. This is more truly impiety than that with which an infidel is chargeable. For suppose two men each received a letter from his father, giving directions for his children's conduct; and that one of these sons, hastily, and without any good grounds, pronounced the letter a forgery, and refused to take any notice of it; while the other acknowledged it to be genuine, and laid it up with great reverence, and then acted without the least regard to the advice and commands contained in the letter: you would say that both of these men indeed were very wrong; but the latter was much the more undutiful son of the two.

Now this is the case of a disobedient Christian, as compared with infidels. He does not, like them, pronounce his father's letter a forgery; that is, deny the truth of the Christian revelation; but he sets at defiance in his life, that which he acknowledges to be the Divine command.

3. Lastly, you should remember that no argument you can bring against unbelievers, will have greater weight with most of them, than a Christian life; and nothing again, will be more likely to increase and confirm their unbelief, than to see Christians living in opposition to the precepts and spirit of the Gospel; and especially to see them indulging bitter and unkind and hostile and uncharitable feelings towards their fellow-creatures, and even their fellow-Christians.

The objection thence raised against the Christian religion, is indeed (as has been above said) not a real and sound one; but still it *will* be raised: and therefore, you cannot too carefully consider how much you will have to answer for, if you contribute to bring an ill name on your Christian faith; and if you do not, on the contrary, endeavour to the utmost, "to adorn the doctrine of God our Saviour, in all things."

AMUSEMENTS IN SCIENCE.

No. VI.

GEOMETRY.—Part 4.

To reduce or enlarge a drawing by means of a simple instrument. Form two flat circles of wood, or of thick pasteboard, of sufficient size to receive the paper on which we are about to make an enlarged copy, or the original, if you intend to make a reduced one.

Fig. 1.

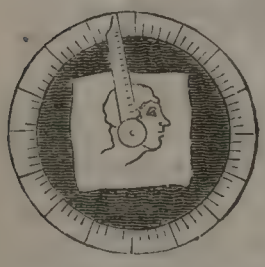
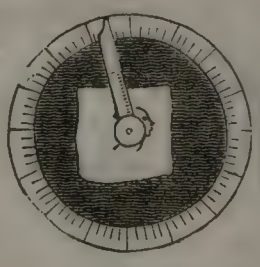


Fig. 2.



Let the outer edge of each of these two circles be divided into any corresponding number of equal parts, with a small hole in the centre of each board to receive a pin, on which a thin piece of brass revolves; this piece of brass is divided, say into twenty-four parts, beginning at the centre, and reaching as far as the inner line of the index on the margin of the circular board. The other circle is furnished with several similar pieces of metal having also twenty-four equal divisions, beginning from the centre; in one case one-half of the distance from the centre to the outer index contains the whole of the twenty-four divisions, in another one-fourth contains the same number, and in another two-thirds.

In order to use this instrument, place the original design on the circle first described, and place the index in its place, the pin, of course, piercing the centre of the paper.

We are supposing now that the drawing is to be reduced, say to one-half its breadth and length. Place a piece of paper sufficiently large on the other circle, and the brass index, on which the twenty-four divisions occupy one-half of its length, in its place on the second circle. Suppose the object to be reduced is a head: place the index on the circle which holds the original drawing, so that it shall exactly cut some particular point in the design, for instance, the corner of the eye. Note which of the twenty-four divisions on the moveable index is opposite to it, and, at the same time, which of the divisions on the circular index is cut by the edge of the straight index. Place the straight edge in the same position on the circle which carries the blank paper.

If the angle of the eye in the original design is opposite the ten on the moveable index, make a dot on the paper opposite the same number of the moveable index of the circle on which the blank paper is placed, and it will show the place of the angle of the eye in the reduced copy. In this manner find as many points as you think necessary for your guidance. If the copy is to be one-fourth the size of the original, use the index in which the twenty-four divisions occupy one-fourth of its length, and so on.

A carpenter having a piece of mahogany of a triangular form, see fig. 3, wished to know how he could cut it up to the best advantage. His first idea was to make an oblong-square table of it, but he found that, if he did so, the waste of the wood would be very great; after consideration, he discovered that the most economical method of using his wood would be to form it into an oval. To make this oval contain as much wood as possible, he proceeded in the following manner: Let B G D be the triangular piece of wood; take G H, one-half of the base, and divide the triangle by drawing a line from H to B; take G H in the compasses, and set it off on one of the sides from G to E, draw the line E F, and the point I will be the centre of the oval; draw K L, parallel to E F, and at the same distance from the centre as the base G D. The points A and C are found by dividing the line from E to K, and drawing A C, or by drawing the dotted lines D A and G C through the centre at I. These points being found, the oval must be completed by the eye of the draughtsman.

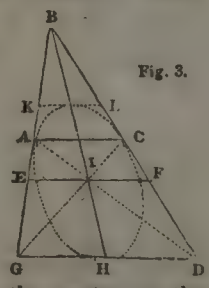


Fig. 3.

In the *Saturday Magazine*, Vol. X., p. 220, in describing the mode of forming a figure of twenty triangular sides, an error occurred in the engraving; two of the triangles forming the sides being omitted. Fig. 4 is a corrected outline.

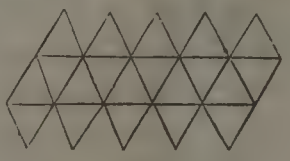


Fig 4.

THERE is hardly a circumstance connected with our existence, which, when examined with a little attention, does not yield abundant evidence of the wisdom and beneficence which preside over the universe. We have only to turn up the soil at our feet, to find in it innumerable seeds useful to man; we have only to look around us upon the surface of the earth, to see it stocked with a variety of animals, conducive not only to our subsistence, but to our convenience and recreation. The sea also, and the air, have their population at our command; and the more deeply we investigate the laws by which the whole system of vegetable and animal life is governed, the more clearly we shall perceive their complete and exclusive adaptation to the planet on which they carry on their operations.—*Quarterly Review.*

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THE

Saturday Magazine.

No. 360. FEBRUARY 10TH, 1838. Price One Penny.

THE ROYAL EXCHANGE OF LONDON.

First erected by Sir Thomas Gresham, in 1566-7.
Visited and named by Queen Elizabeth, 1571.
Destroyed by the Great Fire of London, 1666.
Rebuilt, under the auspices of King Charles the Second, 1668-9.
Destroyed by Fire, January 10, 1838.

THE ROYAL EXCHANGE, LONDON.

In most large commercial cities, it has long been the custom that a particular place should be appropriated to the daily meetings of merchants. The name which was first generally applied to such places is *Bourse*, by which they are still known in Paris, Antwerp, St. Petersburg, and other large cities on the continent. The account given of the origin of the name of Bourse, as applied to a place of meeting for merchants, is this. In the city of Bruges there stood a large ancient building, which had been erected by the noble family of *La Bourse*, (signifying Purse in French and Flemish,) whose coat of arms on the walls was three purses. The merchants of Bruges made this old house the place of their daily assemblies; and when they afterwards went to the fairs of Antwerp and Mons, they called the place appropriated in those cities to similar purposes, by the same name as that which they had applied to the place of meeting in their own city, that is to say,—the Bourse. The French merchants also carried the name into the cities of their own country; and even in London the merchants' place of meeting was called Bourse or Burse, until Queen Elizabeth ordered it to be styled the Royal Exchange; and even afterwards retained the original name among foreigners, who styled it the *Bourse Royal*.

The Bourse or Royal Exchange in London was built by the celebrated merchant, Sir Thomas Gresham,* and before its erection the merchants were accustomed to assemble in the open air in Lombard-street, where they transacted their business, subject to the inclemencies of such an exposure. That these inconveniences were severely felt is proved by the fact that several places were suggested for the erection of a Bourse before any active steps appear to have been taken for the purpose until the year 1531. In that year Sir Richard Gresham's father, Sir Richard, who had the honourable distinction of being styled "the King's Merchant," and who was then serving the office of sheriff, wrote to Sir Thomas Audley, the Lord Privy Seal, requesting him to move the king (Henry the Eighth) to direct a letter to be sent to Sir George Monoux, requiring him to sell certain houses in Lombard-street to the mayor and commonalty, for the purpose of erecting a Burse on the ground of the same for the use of the merchants.

Three years after Sir Richard's application, the king sent a letter to the city, directing that a Burse should be built at Leadenhall; but as the Common Council voted that the place of meeting should not be removed from Lombard-street, no further measures were taken.

Thirty years afterwards, when Elizabeth had been seated on the throne about six years, the scheme was revived with greater effect. Sir Thomas Gresham proposed to the corporation of London, in the year 1564—

That if the city would give him a piece of ground in a commodious spot, he, at his own expense, would erect an Exchange, with large and covered walks, wherein the merchants and traders might daily assemble, and transact business at all seasons, without interruption from the weather, or impediments of any kind.

This offer was accepted; and the foundation of the Exchange was laid by Sir Thomas Gresham on the 7th of June 1566. The superstructure was carried on with rapidity, and the whole covered in with slate by November 1567, soon after which the building was "fully finished."

The upper part of this edifice was divided into shops, which were let out by Sir Thomas at a yearly rent. These shops were seven feet and a half long and five feet broad; from the smallness of their size, it often happened that the same person rented more than one. There were likewise at first, other shops fitted up in the vaults below; but these being found very inconvenient by reason of their dampness and want of light, the vaults were soon let out to other uses. An entry in the Ward-book of Cornhill, under the year 1594, gives us some information as to the manner in which the vaults were then appropriated; it runs thus,—

Presented William Grimbel for keping typlinge in the vaults under the Exchange, and for broyling of *herringes*, *sprotts*, and *bacon*, and other thinges in the same vaults noisome to the merchants and others resortinge to the Exchange.

The number of the upper shops was one hundred and twenty; which, when the vaults had been detached from them, "paid, one with another, a rent of four pounds ten shillings a year, upon leases of twenty-one years." Ward, in his *Life of Gresham*, says, that the tenants placed in them by Sir Thomas were "chiefly young men of small fortunes, but industrious, who, by their diligence, brought great business to their shops, and employed some thousands of poor people in working our manufactures." It would seem, however, that they were not at first very prosperous; for when Elizabeth visited the Exchange, three years after its erection, so many of the shops were unoccupied that Sir Thomas found it necessary to go round among the shopkeepers and entreat them "to furnish and adorne with wares and wax-lights, as many shoppes as they either coulde or woulde, and they should have all those so furnished, rent free for that year." Some time afterwards, Stow's *Continuator*, speaking of this Exchange says, "it is as plenteously stored with all kinde of rich wares and fine commodities as any particular place in Europe; into which place many forraine princes daily send to be best served of the best sort." The same authority enumerates among the tenants of the shops of that period, haberdashers, armourers, apothecaries, booksellers, goldsmiths, and globe-sellers.

The visit mentioned above as having been paid by Queen Elizabeth to the Bourse in 1571, was the occasion of its obtaining the name of "Royal Exchange," by which it has ever since been known. Her Majesty went into the city to dine with Sir Thomas Gresham, and on her return inspected it.

The three and twentieth of Januarie, [1571,] the Queene's Majestie, accompanied with her nobility, came from her house at the Strand, called Summerset-place, and entered the citie of London by Temple Bar, Fleet-street, Cheape, and so by the north side of the Bursse, to Sir Thomas Gresham's in Bishopsgate-street, where she dined. After dinner, her Grace returning through Cornhill, entered the Bursse on the south side; and after her Highness had viewed every part thereof above ground, especially the Pawne, which was richlie furnished with all sorts of the finests wares in the citie, she caused the same Bursse by an herald to be proclaimed *The Royal Exchange*, so to be called from thenceforth and no otherwise.

A curious tradition has been preserved relative to this visit,—namely, that Sir Thomas, before the Queen came to his house, purchased of a foreigner a costly pearl, which, on account of its high price, had been refused by several persons of the first quality, that he caused it to be reduced to powder, and during the entertainment drank it up in a glass of wine. The tradition is embodied in an historical play in which Gresham thus speaks,—

Here fifteen hundred pound at one clap goes,
Instead of sugar Gresham drinkes this pearle
Unto his queen and mistress: pledge it lords.

This story, (says Dr. Ward,) has been handed down by tradition as a real fact, but as I find no historical proof of

* See *Saturday Magazine*, Vol. II., p. 225.

it, I would not be thought to mention it as a thing probable, but only to show upon what evidence it depends; for it seems no way agreeable to the character of Sir Thomas, who always knew how to make the best use of his money.

Sir Thomas Gresham died on the 21st of November, 1579, and by his will bequeathed "the building called the Royal Exchange, with all the pawns and shops, cellars, vaults, messuages, tenements, and other hereditaments" belonging to it, after the determination of the particular uses, estates, and interest for life, and entail thereof, upon the Lady Anne his wife, "jointly for ever to the Corporation of London and the Company of Mercers;" upon trust that the citizens out of their moiety should pay salaries of 50*l.* per annum each to four professors, who should read public lectures gratuitously on Divinity, Astronomy, Geometry, and Music, at his Mansion-house between Bishopsgate-street and Broad-street, afterwards called Gresham College; 6*l.* 13*s.* 4*d.* per annum each, to eight alms-people living behind the said mansion; and 10*l.* annually to each of the prisons of Newgate, Ludgate, the Marshalsea, King's Bench, and Wood-street Compter:—and that the Mercers out of their moiety should pay annual salaries of 50*l.* to each of three persons who should read lectures on Law, Physic, and Rhetoric, at his Mansion-house; 100*l.* for four dinners quarterly, at their own hall, and 10*l.* yearly to Christ's, St. Bartholomew's, St. Thomas's, and Bethlem Hospitals, the Spital and the Poultry Compter.

Lady Gresham continued to receive the emoluments arising from the Royal Exchange, in rents, fines, &c., until her decease, in 1596, before which time they amounted to 751*l.* 5*s.*

The Exchange built by Sir Thomas Gresham, was nearly destroyed in the Great Fire of 1666, not quite one century after its completion. Evelyn, in his account of this awful calamity, laments "the Sumptuous Exchange;" he tells us also, that "Sir Thomas Gresham's Statue, though fallen from its niche in the Royal Exchange, remained entire, when all those of the kings since the Conquest, were broken to pieces." Another eye witness of the great fire, the Rev. T. Vincent, after remarking in his *God's Terrible Voice in the City*, that no stately building was so great as to resist the fury of the flames, continues:

The Royal Exchange itself, the glory of merchants, is now invaded with much violence: when the fire was entered, how quickly did it run round the galleries, filling them with flames: then descending the stairs, compasseth the walks, giving forth flaming vollies, and filling the court with sheets of fire; by and by the kings fell all down upon their faces, and the greatest part of the building after them (the *Founder's statue* only remaining), with such a noise as was dreadful and astonishing.

In an old work styled the "Burning of London in the year 1666, commemorated and improved in a CX. Discourses, Meditations, and Contemplations, by Samuel Rolle, Minister of the Word, and sometime Fellow of Trinity Colledge in Cambridge," we find some curious and interesting remarks upon this subject. In the third part which treats of "the most remarkable passages and circumstances of that dreadful fire," Meditation IX. is *Upon the burning of the Royall Exchange.*

What a princely foundation (says the writer,) was that *Royal Exchange!* and of how great use? Was not that the center in which those lines met that were drawn from all parts of Europe? rich merchants, I mean, and other eminent tradesmen and great dealers, not merely English but Spanish, French, Dutch, Portugueze, Danes, Swedes. Was not the place a little epitomie or rather representative of all Europe (if not of the greatest part of the trading world,) renewed every day, at such a time, and for so many hours? As London was the glory of England, so was that *Royal Exchange* one of the greatest glories and ornaments of London. There were the statues of the kings and queens of England set up, as in the most conspicuous and honourable place (as well receiving lustre from the place where they stood as giving lustre to it.)

How full of riches was that *Royall Exchange.* Rich men in the midst of it, rich goods both above and beneath. There men walk't upon the top of a wealthy mine; considering what Eastern treasures, costly spices, and such like things, were laid up in the bowels, (I mean the cellars,) of that place. As for the upper part of it, was it not the great storehouse whence the nobility and gentry of England were furnished with most of those costly things, wherewith they did adorn either their closets or themselves?

About the space of nineteen months, was that Royall Exchange in building, viz., from June 7th till November in the year following. So that the sunne had finished his annual course once, and almost a second time, ere that work was finished; but was it so many hours in burning as it was months in building?

When this Exchange was burned in 1666 the amount of funds belonging to the trust in the possession of the trustees was only £234. 8*s.* 2*d.*; yet they soon began the work of rebuilding.

The plans and elevations were submitted to Charles the Second in September, 1667, and, on the 23rd of October, the king laid the base of the column on the west side of the north entrance; after which he and his suite were plentifully regaled, under a temporary shed upon the Scotch walk, "with a chine of beef, fowls, hams, dried tongues, anchovies, cavaire, and wines." On the 31st of the same month, the first stone of the column on the east side of the north entrance was laid by the Duke of York, afterwards James the Second, and on the 18th of November, the foundation-stone of the eastern column of the south entrance was laid by Prince Rupert. The architect employed was Mr. Edward Jerman, and not as has been often stated, Sir Christopher Wren; the work was diligently superintended by the joint committee of the Mercers' Company and the Corporation of London, appointed for that purpose by those bodies.

The following official entry was inserted in the books by an order dated Dec. 16, 1667:—

A letter from the Right Honourable the Earl of Manchester, recommending one Caius Gabriel Cibber to the making the statues for the Royal Exchange, and the rather in regard he hath shown his Majesty some models which have been well liked of, having been read; the committee called the gentleman in, and acquainted him that the business of making the statues is yet very much from their thought, having the whole Exchange to build first; and that a new committee will succeed before the main work be effected, to whom, when fitting time shall come, he may do well to apply himself.

Cibber seems to have taken their advice, for he did execute most of the statues.

During the period occupied by the rebuilding of this edifice, the merchants held their meetings at Gresham College, but when the works were sufficiently advanced, they took possession of the New Exchange, which was first publicly opened on the 28th of September, 1669.

The whole cost of rebuilding the edifice was 58,962*l.* Considerable repairs have, at times, been made in this edifice. In the year 1767 Parliament voted 10,000*l.* for the purpose; and it was then found necessary almost to rebuild the western side. But the most extensive reparations and improvements which this fabric has ever undergone were made between the years 1820 and 1826, from the designs and under the superintendence of Mr. George Smith, architect to the Mercers' Company. These consisted of building a new stone tower on the north front, in place of a more lofty one of timber; constructing three new stone staircases of large dimensions; chipping, scraping, and repairing the entire surface

of the edifice; repairing the sculptured figures and scroll-work, the roof, galleries, shops, &c., in short, of renovating the whole structure. The aggregate expenses amounted to about 33,000*l.*, of which the the stone staircases and floors alone cost 6000*l.*

The old tower was a lofty structure, being one hundred and seventy-eight feet in height; it consisted of three stories, with grouped columns and pilasters of the Corinthian and composite orders at the angles. The lower story was stone, the upper stories of timber, finished by a cupola, on which was sustained a ponderous weathercock, in the form of a grashopper. It was a most singular design, and strikingly dissimilar to the various church towers. The tower which replaced it in 1821, and the shell of which remained still standing after the recent conflagration, was only one hundred and twenty-eight feet six inches in height.

Within the area, on the four interior sides of the building, were twenty-five large niches, containing figures of twenty-two of our sovereigns, namely:—on the south side, Edward the First, Edward the Third, Henry the Fifth, and Henry the Sixth; on the west, Edward the Fourth, Edward the Fifth, Henry the Seventh, and Henry the Eighth; on the north, Edward the Sixth, Queen Mary, Queen Elizabeth, James the First, Charles the First, Charles the Second, and James the Second; on the east, within a conjoined or double niche, were William and Mary; George the First, George the Second, George the Third, and George the Fourth.

Such, then, was the Royal Exchange of London, when, on the night of Wednesday, the 10th of January last, it fell a prey to the flames. Soon after ten o'clock on that night, a fire broke out in the north-eastern corner of the edifice; it spread with rapidity towards the west, and in the space of a few hours had made a complete circuit of the quadrangle, destroying, in succession, the northern, western, southern, and eastern sides of the building. Of the tower which rose above the principal entrance on the southern side, the shell alone was left standing; and some of the decorations of the portico above that entrance sustained but little injury. The statue of Charles the Second, which stood in the middle of the area within, was not destroyed; but as the inner walls fell, they carried with them all the royal statues which had formed so conspicuous a feature among their ornaments.

It is of course very improbable that any length of time will elapse before the City of London, be provided with another "Royal Exchange;" and there is little reason to doubt that the new edifice will surpass its predecessor in magnificence. The regrets of some, that "we have not a Sir Christopher Wren to rebuild it now," may be dissipated by the fact, that Sir Christopher Wren had nothing to do with rebuilding it before; and little danger we should trust is to be apprehended of our inability to produce as skilful an artist as Mr. Edward Jerman, notwithstanding that he was considered by the committee in 1667, (when Sir Christopher Wren was living,) to be "the most able known artist," next to "Mr. Mills the city surveyor." At all events, there is little hazard in predicting, that ere long a new edifice will be erected, and in the conceited doggrel of an old ballad, written soon after the Great Fire of 1666,—

> Th' Exchange, that Royal Infant, shortly will
> Her own and forreign language speak with skill,
> And on that acre the noon sun shall see,
> All his long travels in epitomie.

THAT which is good to be done, cannot be done too soon; and if it is neglected to be done early, it will frequently happen that it will not be done at all.—BISHOP MANT.

VEGETABLE PRODUCTIONS OF VARIOUS CLIMATES.

How various are the climates of the earth, and yet how uniform is each climate in its temperature, notwithstanding the fact, that we traverse annually a circle in space whose diameter extends over one hundred and ninety millions of miles. In each particular climate we behold races of animals and plants, many of which would not prosper elsewhere. Though apparently rains, and winds, and frosts are very irregular, yet we find a remarkable constancy in the average of the weather and seasons of each place. Very hot summers, or very cold winters, have little effect in raising or depressing the mean annual temperature of any one climate above or below its general standard. We must be convinced, from observation, that the structure of plants, and the nature of many animals, are specially adapted to the climate in which they are located. A vegetable, for example, which flourishes when the mean temperature is fifty-five degrees, would perish where the average is only fifty. If our mean temperature were raised or lowered by five degrees, our vegetable world would be destroyed, until a new species suited to the altered climate, should be substituted for that which we possess at present. An inhabitant of the equatorial regions, whose mean temperature is eighty, would hardly believe that vegetable life could exist in such a climate as ours. We have the same opinion of the arctic regions. But both are equally mistaken; the care of a presiding Providence is limited to no climate; it

> Lives through all space, extends through all extent,
> Spreads undivided, operates unspent.

At the equator we find the natives of the Spice Islands, the clove, and nutmeg trees, pepper and mace. Cinnamon bushes clothe the surface of Ceylon; the odoriferous sandal-wood, the ebony-tree, the teak-tree, and the banyan grow in the East Indies. In the same latitudes, in Arabia the Happy, we find balm, frankincense, and myrrh, the coffee-tree and the tamarind. But in those countries, at least in the plains, the trees and shrubs which decorate our more northerly climes are wanting. And as we go northwards, at every step we change the vegetable group, both in addition and by subtraction. In the thickets to the west of the Caspian Sea we have the apricot, citron, peach, walnut. In the same latitude, in Spain, Sicily, and Italy, we find the dwarf plum, the cypress, the chestnut, the cork-tree; the orange and lemon-tree perfume the air with their blossoms; the myrtle and pomegranate grow wild among the rocks. We cross the Alps, and we find the vegetation which belongs to Northern Europe, of which England is an instance. The oak, the beech, and the elm, are natives of Great Britain; the elm-tree seen in Scotland and the north of England is the wych-elm. As we travel still farther to the north, the forests again change their character. In the northern provinces of the Russian empire are found forests of the various species of firs, the Scotch and spruce-fir, and the larch. In the Orkney Islands no tree is found but the hazel, which occurs again on the shores of the Baltic. As we proceed into colder regions, we still find species which appear to have been made for these situations. The hoary or cold elder makes its appearance north of Stockholm; the sycamore and mountain-ash accompany us to the head of the Gulf of Bothnia; and as we leave this, and traverse the Dophrian range, we pass in succession the boundary lines of the spruce-fir, the Scotch-fir, and those minute shrubs which botanists distinguish as the dwarf-birch and the dwarf-willow. Here, near to, or within the arctic circle,

we yet find wild flowers of great beauty,—the mezereon, the yellow and white water-lily, and the European globe-flower. And when these fail us, the reindeer-moss still makes the country habitable for animals and man.

So also there are boundaries to the growth of corn, the vine, and the olive. Wheat extends over certain tracts from England to Thibet; it does not flourish in the polar regions, nor within the tropics, except in situations considerably raised above the level of the sea. The temperature required for the cultivation of the vine must not be under fifty, nor much above sixty-three degrees, though, in the warm climates, elevation of situation will correct the excess of heat.

Maize and olives have their favourite regions in France, Italy, and Spain. We first meet with rice west of Milan; it extends over the northern provinces of Persia, and over all the southern districts of Asia, where there are facilities for irrigation.

Millet is one of the principal grains of Africa. Cotton is cultivated in the New World no higher than forty degrees latitude; in the Old it extends to latitude forty-four degrees, being found in Astrachan. Exceptions, indeed, occur with respect to the sugar-cane, the indigo-tree, the plantain, and the mulberry, all natives of India and China; for these productions have found a genial climate in the West Indies and South America. The genuine tea-tree seems indisposed to flourish out of China, though the South American Indians have something like it. The Cassava yams, the bread-fruit-tree, the sago-palm, and the cabbage-tree, are all apparently special provisions for the islands in which they are peculiarly found to flourish.

It is impossible, we think, to reflect upon all this variety of natural wealth, and upon the adaptation of each species to the climate in which it is found, without perceiving that the distribution of those productions,—no one climate yielding a perfect substitute, generally speaking, for that of another,—was originally designed to prompt and to continue throughout human existence, that commercial and friendly intercourse which has been long since established between the inhabitants of countries the most remote from each other.—*Quarterly Review.*

ON READING WORKS OF IMAGINATION.

There has been considerable difference of opinion in regard to the effects produced upon the mind by fictitious narratives. Without entering minutely upon the merits of this controversy, I think it may be contended that two evils are likely to arise from much indulgence in works of fiction. The one is a tendency to give way to the wild play of the imagination, a practice most deleterious both to the intellectual and moral habits. The other is a disruption of the harmony which ought to exist between the moral emotions and the conduct,—a principle of extensive and important influence. In the healthy state of the moral feelings, for example, the emotion of sympathy excited by a tale of sorrow, ought to be followed by some efforts for the relief of the sufferer. When such relations in real life are listened to from time to time without any such efforts, the emotion gradually becomes weakened, and that moral condition is produced which we call selfishness, or darkness of heart. Fictitious tales of sorrow appear to have a similar tendency,—the emotion is produced without the corresponding conduct; and, when this habit has been much indulged, the result seems to be, that a cold and barren sentimentalism is produced, instead of the habit of active benevolence. If fictitious narratives be employed for depicting scenes of vice, another evil of the greatest magnitude is likely to result from them, even though the conduct exhibited should be shown to end in remorse and misery. For by the mere familiarity with vice, an injury is done to the youthful mind, which is in no degree compensated by the moral at the close. Imagination, therefore, is a mental power of extensive influence, and capable of being turned to important purposes in the cultivation of individual character. But to be so, it must be kept under the strict control of reason and of virtue. If it be allowed to wander at discretion, through scenes of imagined wealth, ambition, frivolity, or pleasure, it tends to withdraw the mind from the important pursuits of life, to weaken the habits of attention, and to impair the judgment. It tends in a most material manner, to prevent the due exercise of those nobler powers which are directed to the cultivation both of science and virtue.

The state of a mind which has yielded itself to the influence of this delusive habit, cannot be more forcibly represented than in the words of an eloquent writer:—

The influence of this habit of dwelling on the beautiful fallacious forms of imagination, will accompany the mind into the most serious speculations, or rather, musings, on the real world, and what is to be done in it, and expected; as the image which the eye acquires from looking at any dazzling object, still appears before it wherever it turns. The vulgar materials that constitute the actual economy of the world, will rise up to its sight in fictitious forms, which it cannot disenchant into plain reality, nor will even suspect to be deceptive. It cannot go about with sober, rational inspection, and ascertain the nature and value of all things around it. Indeed, such a mind is not disposed to examine, with any careful minuteness, the real condition of things. It is content with ignorance, because environed with something more delicious than such knowledge, in the paradise which imagination creates. In that paradise it walks delighted, till some imperious circumstance of real life call it thence, and gladly escapes thither when the avocation is past. There everything is beautiful and noble, as could be desired to form the residence of an angel. If a tenth part of the felicities that have been enjoyed, the great actions that have been performed, the beneficent institutions that have been established, and the beautiful objects that have been seen in this happy region, could have been imported into this terrestrial place, what a delightful thing it would have been to awake each morning to see such a world once more.

To the same purpose are the words of another writer of the highest authority:—

To indulge the power of fiction, and send imagination out upon the wing, is often the sport of those who delight too much in silent speculation. He who has nothing external that can divert him, must find pleasure in his own thoughts, and must conceive himself what he is not,—for who is content with what he is? He then expatiates in boundless futurity, and culls from all imaginable conditions that which, for the present moment, he should most desire; amuses his desires with impossible enjoyments, and confers upon his pride unattainable dominion. The mind dances from scene to scene, unites all pleasures in all combinations, and riots in delight which nature and fortune, with all their bounty, cannot bestow. In time, some particular train of ideas fixes the attention; all other intellectual gratifications are rejected; the mind, in weariness or leisure, recurs constantly to the favourite conception, and feasts on the luscious falsehood whenever she is offended with the bitterness of truth. By degrees the reign of fancy is confirmed; she grows first imperious, and in time despotic. Then fictions begin to operate as realities, false opinions fasten upon the mind, and life passes in dreams of rapture or of anguish.

[Abercrombie *on the Intellectual Powers.*]

Whatever God himself has pleased to think worthy of his making, its fellow-creature man should not think unworthy of his knowing.—Boyle.

FROSTS, AND FROST FAIRS, UPON THE RIVER THAMES.

WITHIN the last eight hundred years several instances are recorded in our history of frosts so severe as to render the surface of the Thames, at London, one immoveable mass of ice; the last of them occurred within the memory of the present generation. Upon these occasions the river has been the scene of diversions and amusements, remarkable indeed, not so much in themselves, as from the nature of the place in which they were practised.

As early as 1092, in the reign of William Rufus, is recorded a frost "whereby," in the words of an old chronicler, "the great streams [of England] were congealed in such a manner that they could draw two hundred horsemen and carriages over them; whilst at their thawing, many bridges, both of wood and stone, were borne down, and divers water-mills were broken up, and carried away." In 1281, is mentioned another frost and snow "such as no man living could remember the like;" five arches of London-bridge were on this occasion "borne downe and carried away with the streame."

The winter of 1564-5 was remarkable for a very severe frost which began on the 21st of December, and according to Holinshed continued to such an extremity, that on New Year's Eve "people went over and alongst the Thames on the ise from London-bridge to Westminster."

Some plaied at the football as boldlie there as if it had beene on the drie land; diverse of the Court being then at Westminster, shot dailie at prickes set upon the Thames; and the people, both men and women, went on the Thames, in greater numbers, than in anie street of the Citie of London. On the third daie of January, at night, it began to thaw, and on the fift there was no ise to be seene betweene London Bridge and Lambeth, which sudden thaw caused great floods and high waters, that bare downe bridges and houses, and drowned manie people, in England; especiallie in Yorkshire, Owes Bridge was borne awaie with others."

The next remarkable frost recorded is that of 1608. It begun on the 8th of December, and continued until the 15th; a thaw then ensued until the 22nd, when it began "againe to freeze violently, so as divers persons went halfe way over the Thames upon the ice; and the 30th of December, at every ebbe, many people went quite over the Thames in divers places, and so continued until the 3rd of January."

The people passed daily betweene London and the Bankside at every halfe ebbe, for the floud removed the ice and forced the people daily to tread new paths, except onely betweene Lambeth and the ferry at Westminster, the which, by incessant treading, became very firm, and free passage, untill the great thaw; and from Sunday, the tenth of January, until the fifteenth of the same, the frost grew so extreme, as the ice became firme, and removed not, and then all sorts of men, women, and children, went boldly upon the ice in most parts; some shot at prickes; others bowled and danced, with other variable pastimes, by reason of which concourse of people, there were many that set up boothes and standings upon the ice, as fruit-sellers, victuallers, that sold beere and wine, shoomakers, and a barber's tent, &c."

In these tents were fires. The ice lasted till the afternoon of the 2nd of February, when "it was quite dissolved and clean gon."

In the winter of 1683-4 the festivities of a frost fair were again witnessed on the Thames at London. The frost commenced in the beginning of December, and lasted until the 5th of February. The river was congealed to that degree, that another city, as it were, was created thereon; where, by the great number of streets, and shops, with their rich furniture, it represented a great fair, with a great variety of carriages, and diversions of all sorts; and near Whitehall, a whole ox was roasted on the ice."

Evelyn, however, who was an eye-witness of this scene, furnishes the following extraordinary account of it in his *Diary*, of January the 24th.

The frost continuing more and more severe, the Thames before London was still planted with boothes in formal streetes, all sortes of trades and shopes furnish'd, and ful of commodities, even to a printing-presse, where the people and ladyes tooke a fancy to have their names printed, and the day and yeare set down when printed on the Thames: this humour tooke universally, that 'twas estimated the printer gain'd 5*l.* a day, for printing a line onely, at sixpence a name, besides what he got by ballads, &c. Coaches plied from Westminster to the Temple, and from several other staires to and fro, as in the streetes; sleds, sliding with skertes, a bull-baiting, horse and coach races, puppet-plays, and interludes, cookes, tipling, and other places, so that it seem'd to be a bacchanalian triumph, or carnival on the water.

Upon this occasion king Charles the Second, his queen, and several other personages of the Royal Family visited the diversions upon the ice; and even had their names printed on the ice in conformity with the "humour" which Evelyn mentions as so prevalent. There is still in existence one of the very papers on which the king and his royal companions had their names printed; and we need hardly say that among collectors of the curious, it is regarded as an invaluable rarity. It contains the names of "Charles, king;" his brother "James, duke" (of York) afterwards James II.; "Katherine Queen" the Infante of Portugal; "Mary, Dutchess;" Mary D'Este, sister of the duke of Modena, and second wife of James; "Ann, Princesse," second daughter of the duke of York, afterwards Queen Anne; and "George, Prince" of Denmark, her husband. The king's visit is thus noticed in a small poem printed on the river, entitled *Thamasis's Advice to the Painter from her Frigid Zone; or Wonders upon the Water.*

Then draw the *King*, who on his *Leads* doth stay,
To see the *Throng* as on a *Lord Mayor's day*;
And thus unto his *Nobles* pleas'd to say;
With these *Men* on this *Ice*, I'de undertake
To cause the *Turk* all *Europe* to forsake:
An army of these *Men*, arm'd and compleat,
Would soon the *Turk* in *Christendom* defeat!

The same poem contains the following advice to its readers:—

..... to the *Print-house* go
Where *Men* the *Art of Printing* soon do know:
Where for a *Teaster* you may have your *Name*
Printed, hereafter for to show the same;
And sure in *former Ages* ne'er was found
A *Press* to *print* where men so oft were dround!

In 1709 the Thames was again frozen over at intervals, and some persons crossed on the ice, but the frost was not sufficiently permanent to allow another Frost Fair. But in 1715-6 all the sports of 1683 were renewed, the frost beginning at the end of November, and lasting till the 9th of February following.

Our engraving represents a view of the memorable Frost Fair on the Thames in the Winter of 1739–40, the most severe which had occurred since the year 1716. In the beginning of it, the houses then standing on London Bridge received considerable damage from the many vessels which broke from their moorings and lay beating against them. On the 31st of December, it was announced in one of the newspapers that "all the watermen above the bridge have hauled their boats on shore, the Thames being very nigh frozen over." The "rocks" and "shoals" of ice which for some time floated on the river, became at length united into one solid mass, and represented "a snowy field everywhere rising in masses and hills of ice and

snow." Tents and printing-presses were speedily erected, and a complete Frost Fair was once more established; but some persons lost their lives in walking over the river. Among the productions of the press upon this occasion, were the following lines "Printed on the Ice upon the Thames at Queenhithe, January the 29th, 1739–40."

Behold the liquid THAMES now frozen o'er
That lately SHIPS of mighty burden bore.
Here you may PRINT your name tho' cannot write
'Cause numb'd with cold: 'Tis done with great delight.
And lay it by; That AGES yet to come
May see what THINGS upon the ICE were done.

In one of the newspapers for the 2nd of January, it was announced that—

Several vintners in the Strand bought a large ox in Smithfield on Monday last, which is to be roasted whole on the ice on the River of Thames, if the frost continues.

Mr. Hodgeson, a butcher in St. James's Market, claims the privilege of selling, or knocking down, the beast, as a right inherent in his family, his father having knocked down the ox roasted on the river, in the great Frost, 1684; as himself did that roasted in 1715, near Hungerford-stairs. The beast is to be fixed to a stake in the open market, and Mr. Hodgeson comes dressed in a rich laced cambric apron, a silver steel, and a hat and feathers to perform the office.

The breaking up of this famous frost was attended with some amusing scenes; it is thus noticed in a newspaper of January 22nd:—

Yesterday morning the inhabitants of the west prospect of the bridge were presented with a very odd scene; for, on the opening of their windows there appeared underneath, on the river, a parcel of booths, shops, and huts, of different forms, and without any inhabitants, which, it seems, by the swell of the waters, and the ice separating, had been brought down from above. As no lives were lost, it might be viewed without horror. Here stood a booth with trinkets, there a hut with a dram of old gold; in another place, a skittle-frame and pins, and in a fourth "the Noble Art and Mystery of Printing, by a servant to one of the greatest trading companies in Europe." With much difficulty last night, they had removed the most valuable effects.

In 1768 another remarkable frost took place, and in 1785 another, which lasted for one hundred and fifteen days. In 1789 the Thames was again frozen over, and a Fair held on the ice, several booths being erected on the 9th of January. Passages across the ice, strewed with ashes, were formed at Gun-dock, Execution-dock, &c., and these parts seem to have constituted the principal scenes of attraction.

No sooner, (says a contemporary chronicle,) had the Thames acquired a sufficient consistency, than booths, turn-abouts, &c. &c., were erected; the puppet-shows, wild beasts, &c., were transported from every adjacent village; whilst the watermen, that they might draw their usual resources from the water, broke in the ice close to the shore, and erected bridges, with toll-bars, to make every passenger pay a halfpenny for getting to the ice. One of the suttling-booths has for its sign, "Beer, Wine, and Spirituous Liquors, without a License." A man who sells hot gingerbread, has a board, on which is written, "no shop-tax nor window duty." All the adventurers contend, in these short sentences, for the preference of the company, and the Thames is in general crowded.

Another specimen of the humour exhibited at this place, was contained in the following inscription on a temporary building on the Thames:—"This Booth to Let. The present possessor of the premises is Mr. Frost. His affairs, however, not being on a permanent footing, a dissolution or bankruptcy may soon be expected, and the final settlement of the whole intrusted to Mr. Thaw." On Wednesday, January the 7th, a large pig was roasted on one of the principal roads; and on Monday, the 12th, a young bear was hunted on the ice, near Rotherhithe. As usual, too, a printing-press was erected near the same spot; the following is one of the Bills printed "on the ice, at the Thames Printing Office, opposite St. Catherine's Stairs:"—

The silver Thames was frozen o'er,
No difference 'twixt the stream and shore,
The like no Man hath seen before
Except he lived in days of yore.

The frost was severely felt to a great distance down the river; the East India ships were hastily sent down to Gravesend, to which place, and even below it, large shoals of ice had floated. The navigation of boats was entirely stopped, and it was supposed that the river would soon be completely impassable from London Bridge to Woolwich. Every morning at London Bridge, vast quantities of boiling water were poured on the water-works before the wheels could be set in motion; and twenty-five horses were daily employed in removing the ice which surrounded them. At Blackfriars, the masses of floating ice were said to be eighteen feet in thickness; the surface of the river in some places was "smooth for a mile or two," and then "rough and mountainous" from the bodies of frozen snow. Putney and Fulham, "from the morning dawn till the dusk of returning evening, were a scene of festivity and gaiety."

The thaw which followed this frost was rapid. It had been for some time expected, and at length it commenced with some rain about two o'clock on Tuesday, January the 13th; and before night, the streets were almost overflowed.

Perhaps, (says a newspaper of the time,) the breaking up of the Fair upon the Thames last Tuesday night below bridge, exceeded every idea that could be formed of it, as it was not until after the dusk of the evening, that the busy crowd was persuaded of the approach of a thaw. This, however, with the cracking of some ice about eight o'clock, made the whole a scene of the most perfect confusion; as men, beasts, booths, turn-abouts, puppet-shows, &c. &c., were all in motion, and pouring towards the shore on each side. The confluence here was so sudden and impetuous, that the watermen who had formed the toll-bars over the sides of the river, where they had broken the ice for that purpose, not being able to maintain their standard from this crowd, &c., pulled up the boards, by which a number of persons who could not leap, or were borne down by the press, were soused up to the middle. The difficulty of landing at the Tower-stairs was extreme, until near ten o'clock, occasioned by the crowding of the people from the shore, who were attracted by the confusion on the water. The inconvenience to the shipping is now increased more than ever, since the setting in of the frost, as no persons will venture upon the ice to fetch or carry anything for them, and it is not yet sufficiently disunited for a boat to live.

The last Frost Fair upon the River Thames at London, was held in the beginning of the year 1814. The frost commenced on the evening of the 27th of December preceding, with a thick fog which lasted for several days, and was succeeded by a remarkably heavy fall of snow, which continued for nearly two days with slight intermissions. The cold became intense, the wind blowing almost constantly from the north and north-east; the river was covered with vast fragments of ice and hardened snow, which floated along with the tide, and sometimes united to form a hard and fixed mass. After this frost had lasted for a whole month, a thaw of four days, from the 26th to the 29th of January, took place; and so large a quantity of ice was floated down in detached pieces, that the river between Blackfriars and London Bridges, became almost impassable. But this thaw was succeeded by a renewal of the frost, so severe, that the Thames very soon became one immoveable sheet of ice; and even on Sunday, the 30th, was crossed by some venturous persons on foot in different parts. On Tuesday, the 1st of February, the usual entries were formed by the unemployed water-

men, particularly between Blackfriars Bridge and Three Cranes Wharf; and notices were posted in the streets leading thereto, announcing a safe footway over the river. It is said that many of the watermen received six pounds in the day by the toll which they took from persons passing over their little bridges, from the edge of the river to the firm ice.

The standing amusements of an English Frost Fair now commenced, (says Mr. Richard Thomson in his *Chronicles of London Bridge*,) and many cheerfully paid to see and partake of that upon the frozen Thames, which at any other time they would not have deigned to look upon. Beside the roughly-formed paths paved with ashes, leading from shore to shore, there was a street of tents called the "City Road," in which gay flags, inviting signs, music and dancing, evinced what excellent entertainment was to be found there. That ancient wonder, peculiar to the place, the roasting of a small sheep over a fire, was exhibited to many a sixpenny audience, while the provision itself, under the name of "Lapland Mutton," sold for one shilling a slice! Several printing-presses were also erected to furnish memorials of the Frost in old verse and new prose.

Some of these papers are amusing; especially those which apostrophize the Printing-press in its novel situation:—

> You that walk here, and do design to tell
> Your children's children what this year befell
> Come buy this print, and then it will be seen,
> That such a year as this hath seldom been.

The logical precision of the inference in the last two lines of this effusion, is not more curious than the following grandiloquent burst of panegyric upon the Press.

OMNIPOTENT PRESS! Tyrant Winter has enchained the noblest torrent that flows to the main; but Summer will return and set the captive free. So may tyranny for a time "freeze the genial current of the soul;" but a Free Press, like the great source of light and heat, will, ere long, dissolve tyranny of the mightiest. Greatest of the arts! What do we not owe to thee? The knowledge which directs industry, the liberty which encourages it, the security which protects it, and of industry how precious are the fruits! Glowing and hardy temperaments, which defy the vicissitudes of seasons, and comfortable homes which make you regret not the gloom that is abroad. But for Industry, but for Painting, you might now have been content, like the Russ and Laplander, to bury yourselves under that snow over which you now tread with mirth and glee. Printed on the River Thames, and in commemoration of a great fair held upon it on the 31st of January, 1814, when it was completely frozen over from shore to shore. The frost commenced the 27th of December, 1813, and was accompanied by a thick fog that lasted eight days; and after the fog, came a heavy fall of snow, that prevented all communication with the northern and western parts of the country for several days.

Another bill upon the same subject, containing fewer reflections and more humour, promises that the press shall be kept going "in the true spirit of liberty,"—if the public buy impressions.

Friends! Now is your time to support the freedom of the Press! Can the Press have greater liberty? Here you find it working on the middle of the Thames; and if you encourage us by buying our impressions, we will keep it going in the true spirit of liberty during the frost.

One of the last papers printed on the river ran thus:—

TO MADAM TABITHA THAW.]

Dear Dissolving Dame.

FATHER FROST and SISTER SNOW have *bonyed* my borders, formed an *idol of ice* upon my bosom, and all the LADS OF LONDON come to make merry; now, as you love mischief, treat the multitude with a few CRACKS by a sudden visit, and obtain the prayers of the poor upon both banks.

Given at my own Press, the 5th of February 1814.

THOMAS THAMES.

Upon the evening of the very day on which this invocation was printed, "Madam Tabitha Thaw," suddenly made her appearance with a fall of rain; the ice cracked and floated in several places, and about two o'clock on the following day, the tide, which during the frost had apparently not risen above half its usual height, began to flow very rapidly. The river was covered with detached masses of ice, and every vestige of this last Frost-Fair speedily disappeared.

The features of this British Carnival (said Mr. Thomson a few years ago,) are in the memories of the greater part of the present generation; though if it were otherwise, the representations of it are few and scarce, and generally very inferior.

FROST FAIR ON THE RIVER THAMES,
1739-40.

LONDON: Published by JOHN WILLIAM PARKER, WEST STRAND; and sold by all Booksellers.

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QUEEN ELIZABETH; HER PROGRESSES AND PUBLIC PROCESSIONS.

COSTUME OF QUEEN ELIZABETH WHEN YOUNG.

PART THE THIRD.

Education of Elizabeth—her Literary Attainments—her Portrait.

The Princess Elizabeth, in common with her brother Edward and her sister Mary, received an excellent education; for this she was much indebted to her step-mother Catherine Parr, the last queen of Henry the Eighth. Her instruction was not confined even to what may be called the ordinary learning of the age; for it embraced the Greek language, which, though rapidly rising into cultivation, had not then become an object of general study. Her first master of the learned languages was William Grindal, a pupil of the eminent Roger Ascham; and in 1548, upon Grindal's death, Ascham himself was called to court to take his place. He had previously been employed in teaching Elizabeth, her brother Edward, and many other illustrious personages, the art "of writing a fair hand," an art in which he had attained great excellence, and in which, excellence was then highly valued on account of its rarity.

We have, from the pen of Ascham, a very interesting account of the course of study through which he led his illustrious pupil, and of the proficiency which she attained in learning; together with some remarks upon her manners and character at that early period of her life. It is contained in a letter which he wrote to a learned friend in the year 1550:

Never (he says), was the nobility of England more lettered than at present. Our illustrious King Edward, in

talent, industry, perseverance, and erudition, surpasses both his own years and the belief of men. ..... Numberless honourable ladies of the present time, surpass the daughters of Sir Thomas More in every kind of learning. But amongst them all, my illustrious mistress, the lady Elizabeth, shines like a star, excelling them more by the splendour of her virtues and her learning than by the glory of her royal birth. In the variety of her commendable qualities I am less perplexed to find matter for the highest panegyric than to circumscribe that panegyric within just bounds. Yet I shall mention nothing respecting her but what has come under my own observation. For two years she pursued the study of Greek and Latin under my tuition; but the foundations of her knowledge in both languages were laid by the dilgent instruction of William Grindal, my late beloved friend, and seven years my pupil at Cambridge.

The lady Elizabeth has completed her sixteenth year; and so much solidity of understanding, such courtesy united with dignity, have never been observed at so early an age. She has the most ardent love of true religion, and of the best kind of literature. The constitution of her mind is exempt from female weakness, and she is endued with a masculine power of application. No apprehension can be quicker than hers, no memory more retentive. French and Latin she speaks like English; Latin with fluency, and judgment; she also spoke Greek with me frequently, and moderately well. Nothing can be more elegant than her handwriting, whether in the Greek or Roman character. In music she is very skilful, but does not greatly delight.

He then gives an account of the different writings which were the object of her study under his tuition.

She read with me almost the whole of Cicero, and a great part of Livy: from these two authors, indeed, her knowledge of the Latin language has been almost exclusively derived. The beginning of the day was always devoted by her to the New Testament in Greek, after which she read select orations of Isocrates and the tragedies of Sophocles, which I judged best adapted to supply her tongue with the purest diction, her mind with the most excellent precepts, and her exalted station with a defence against the utmost power of fortune. For her religious instruction she drew first from the fountains of Scripture, and afterwards from St. Cyprian, the *Common Places* of Melancthon, and similar works which convey pure doctrine in elegant language. In every kind of writing she easily detected any ill-adapted or far-fetched expression. She could not bear those feeble imitators of Erasmus who bind the Latin language in the fetters of miserable proverbs; on the other hand, she approved a style chaste in its propriety and beautiful by perspicuity, and she greatly admired metaphors when not too violent, and antitheses when just and happily opposed. By a diligent attention to these particulars, her ears became so practised and so nice, that there was nothing in Greek, Latin, or English, prose or verse, which, according to its merits or defects, she did not either reject with disgust or receive with the highest delight.

Ascham's employment as tutor to the Princess Elizabeth lasted only two years, at the expiration of which he left her a little abruptly, in consequence of a distaste which he had taken to some persons in her household. "Of this precipitation," says Dr. Johnson, "he long repented; and as those who are not accustomed to disrespect cannot easily forgive it, he probably felt the effects of his imprudence to his death." He was restored, however, before long, to the favour of Elizabeth; and when she ascended the throne, he was appointed to the offices of secretary for the Latin tongue, and likewise tutor to her Majesty in the learned languages. In this latter capacity he was in the habit of constantly reading with her. In his *Scholemaster*, he says,—

After dinner (at Windsor Castle, on the 10th of December, 1568), I went up to read with the Queen's Majesty; we read there together in the Greek tongue, as well remember that noble oration of Demosthenes against Æschines, for his false dealing in his embassage to Philip of Macedon.

Elizabeth retained a great regard for her tutor to the last; and when she heard of his death she is said to have exclaimed, that "she would rather have thrown ten thousand pounds into the sea than have lost her Ascham,"—an opinion which, considering her economical disposition, must be taken to express a very high estimate of his merits. Of the extent to which she profited by his instructions, and of the proficiency which she long retained in the Latin tongue, a memorable illustration was afforded when the Polish Envoy, whom she received in great state, addressed her in a Latin speech, and poured forth, in his master's name, a string of complaints instead of compliments—which caused the Queen, in her own phrase, to "scour up her old Latin which had so long lain rusting," to rebuke the "malapert orator," an operation which she performed, according to the testimony of persons present, with great effect.

Elizabeth's studious turn of mind, probably contributed much to that peculiar regard which her brother Edward felt for her, and which she reciprocated. "In tastes, feelings, pursuits, and religion," to use the words of Mr. Sharon Turner, "there was that congeniality of mind which most strongly attracts and perpetuates reciprocal affection."

Under Edward the Sixth, (says Sir Robert Naunton,) she was his, and one of the darlings of fortune, for besides the consideration of blood, there was between these two princes, a concurrence and sympathy of their natures and affections, together with the cœlestial bond (confirmative religion) which made them one; for the king never called her by any other appellation but his sweetest and dearest sister, and was scarce his own man she being absent; which was not so betweene him and the Lady Mary.

Camden tells us that she was in great grace and favour with her brother King Edward, "who called her by no other name than his *Sweet Sister Temperance*,"—as likewise in singular esteem with the nobility and people. "For she was of admirable beauty and well deserving a crown, of a modest gravity, excellent wit, royal soul, happy memory, and indefatigably given to the study of learning."

She wrote frequently to Edward; and though not many years older than himself, "strove to exhibit in her style some of the elaborate but least natural embellishments of literary composition." His affection for her led him to desire her portrait, though with the delicacy of inquiring if he might make the request; and she took some trouble to accompany it with the "artificial flowers of rhetorical diction." Her letter is an interesting specimen of her style:—

Like as the richeman that dayly gathereth riches to riches, and to one bag of money layeth a greate sort til it come to infinit, so methinks your Majestie, not beinge suffised withe many benefits and gentilnes shewed to me afore this time, dothe now increase them in askinge and desiring wher you may bid and commande, requiring a thinge not worthy the desiringe for it selfe, but made worthy for your Higthnes request. My pictur I mene, in wiche if the inward good mynde towarde your grace migth as wel be declared as the outwarde face and countenaunce shal be seen, I wold nor have taried the commandement, but preuent [prevented] it, nor have bine the last to graunt, but the first to offer it. For the face I graunt I might wel blusche to offer, but the mynde I shal never be ashamed to present. For thogth from the grace of the pictur the coulers may fade by time, may give by weather, may be spotted by chance; yet the other nor time with her swift winges shal ouertake, nor the mistie cloudes with ther loweringes may darken, nor chance with her slipery fote may overthrow. Of this althogth yet the profe coulde not be greate because the occasions hath bine but smal, notwithstandinge as a dog hathe a day, so may I perchaunce have time to declare it in dides wher now I do write them but in wordes. And further I shal most humbly beseche your Maiestie that when you shal loke on my pictur you wil witsafe [vouchsafe] to thinke that as you have but the outwarde shadow of the body afore you, so my inward minde wischeth that the body it selfe wer oftner in your presence; howbeit bicause bothe my so beinge I thinke coulde do your Maiestie litel pleasur thogth my selfe great good; and againe bicause I se as yet not the time agreing therunto, I shal lerne to folow this

sainge of Orace [Horace] "Feras non culpes quod vitairi non potest," [Bear not blame what cannot be avoided.] And thus I wil (troblinge your Maiestie I fere) ende with my most humble thankes, besechinge God longe to preserve you to his honour, to your comfort, to the realme's profit and to my joy. From Hatfilde this 15 day of May,

Your Maiesties most humbly sistar,

ELIZABETH.

This letter very well illustrates the remark of her tutor Ascham, that she was a great admirer of metaphor and antithesis. Of the few letters which exist, from Elizabeth to her brother, there is another which commences in precisely the same elaborate manner.

Like as a shipman in stormy wether plukes downe the sailes tarijnge for bettar winde, so did I most noble kinge, in my unfortunate chanche a thurday pluk downe the hie sailes of my ioy and comfort, and do trust one day, that as troblesome waves have repulsed me bakwarde, so a gentil winde wil bringe me forwarde to my haven.

After her father's death, Elizabeth resided for some time with her step-mother, the Queen Dowager, who married the Lord Seymour of Sudley, the ambitious and unfortunate brother of the Protector Somerset. The palace of Hatfield was afterwards her residence; and in 1551, Edward granted to her the old abbey of Ashridge, which, at the dissolution of the monasteries, became a royal house. She occasionally visited her brother's court; and Strype records an instance of her riding through London in great state, to the palace of St. James:—

March 17, 1551. The lady Elizabeth, the king's sister, rode through London unto St. James's, the king's palace, with a great company of lords, knights, and gentlemen; and after her a great company of ladies and gentlemen on horseback, about two hundred. On the 19th, she came from St. James's through the park to the court; the way from the park-gate unto the court spread with fine sand. She was attended with a very honourable confluence of noble and worshipful persons of both sexes, and received with much ceremony at the court-gate."

A very curious memorial of the domestic affairs of the Princess Elizabeth, about this time, has been preserved—namely, the Household Book for a year, from the 1st of October, 1551, to the last day of September, 1552. It is entitled "Th' Accumpte of Thomas Parry Esquyer, Couferor [Cofferer,] to the righte excellent Princesse the Ladie Elizabeth, her Grace the King's Majestie's most honorable Sister." Every page is signed at the bottom by the Princess herself.

The sum total of receipts, including the "remayne of the preceding year," amounts to 5791*l.* 1*s.* 3¼*d.*, with the third part of a farthing. The total amount of the payments within the time of the accompt, is 3629*l.* 18*s.* 8¼*d.*; and there was left for the wants of the next year, a "remayne" of 1507*l.* 0*s.* 0½*d.*, a half farthing and the third part of a farthing, which sum is stated to have been delivered into her Grace's own hands upon the determination of this accompt. The expenses of the house amounted to 3938*l.* 18*s.* 7*d.*; but deductions for "hides, felles, and intrails of the cattle," supplied 207*l.* 3*s.* 8½*d.* Under the Buttry and Cellar, great quantities of Beer are entered with "swete wine," "Raynishe wine," and "Gascoigne wine." Board wages for servants are continually mentioned. Lamprey pies are once entered as a present.

The wages of household servants for a quarter of a year, amounted to 82*l.* 17*s.* 8*d.* The "lyveries" of velvet coats for xiij gentlemen, at xl*s.* The lyveries of the yeomen to 78*l.* 18*s.* There is also a sum of 7*l.* 15*s.* 8*d.*, mentioned as "given in almes at sundrie times to poor men and women." Among the entries of the Chamber and Robes are the following:—

Paid to John Spithonius the xvij*th* of Maye, for bokes, and to Mr. Allin for a Bible, xxvij*s.* iiij*d.*

Paid the thurde of November to the kepar of Herforde gayle for fees of John Wingfelde lying in warde, xiij*s.* iiij*d.*

Paid to Edmunde Allin for a Bible xx*s.*

Paid the xiiij*th* of December to Blaunche Parry for her half yeres annuitie, c*s.*, and to Blaunche Qurtnaye for the like, lxvi*s.* viij*d.*

Paid the xiiij*th* of December at the Cristening of Mres. Pendred's childe as by warraunte doth appeare, l*s.*

Paid in reward unto sondrie persons at St. James, her Grace then being there, viz.:—The king's fotemen xl*s.* The under kepar of St. James x*s.* The Gardener v*s.* To one Russel, grome of the Kinge's great chamber x*s.* John Forman x*s.* To the Warderobe xl*s.* The Violans xl*s.* A Frenchman that gave a boke to her Grace x*s.* The kepar of the Parke Gate of St. James x*s.* Mr. Staunfords servants xx*s.* The Lorde Russell's minstralls x*s.* In th' ole, as by warrant appereth, ixli. xv*s.*

Paid in reward to sondrie persons the x*th* of August, viz., to Farmer that plaied on the lute, xxx*s.* To Mr. Ashfelde servant, with ij prise oxen & x muttons, xx*s.* More, the harper, xxx*s.* To him that made her Grace a table of walnut-tree, xliiij*s.* ix*d.* And to M. Cocke's servaunte which brought her Grace sturgeon, vj*s.* viij*d.*

Our engraving contains a portrait of Elizabeth, originally taken from a picture by Holbein, executed in the year 1551, when she was about eighteen years of age. A Venetian ambassador, who was in England a few years afterwards, in the report which, in conformity with the practice of his state, he presented to the Doge and Senate, thus describes her personal appearance:

She is a lady of great elegance, both of body and mind, although her face may rather be called pleasing than beautiful. She is tall and well made; her complexion, fine though rather sallow; her eyes, but above all her hands, which she takes care not to conceal, are of superior beauty.

Camden, as has been seen, describes her in her youth as being of "admirable beauty."

The simplicity of Elizabeth's costume in this portrait, offers a remarkable contrast to that fantastic style of decoration in which she afterwards delighted to display her person. Holbein was remarkably careful in preserving the features of costume, and we have other testimony to his correctness in this instance. "With respect to personal decoration," says her tutor Ascham, in the letter before quoted, "she greatly prefers a simple elegance to show and splendour, so despising the outward adorning of plaiting the hair and wearing of gold, that, in the whole manner of her life, she rather resembles Hippolyta than Phædra." Dr. John Elmer, or Aylmer, who was tutor to Lady Jane Grey and her sisters, and became Bishop of London in Elizabeth's reign, thus speaks of the taste of the princess in this respect when young, in a work entitled,—*A Harbour for faithful Subjects.*

The king left her rich clothes and jewels; and I know it to be true, that, in seven years after her father's death, she never in all that time looked upon that rich attire and precious jewels but once, and that against her will. And that there never came gold or stone upon her head till her sister forced her to lay off her former soberness, and bear her company in her glittering gayness; and then she so wore it as every man might see that her body carried that which her heart misliked. I am sure that her maidenly apparel, which she used in King Edward's time, made the noblemen's daughters and wives to be ashamed to be dressed and painted like peacocks, being more moved with her most virtuous example than with all that ever Peter or Paul wrote touching that matter. Yea, this I know, that a great man's daughter, (Lady Jane Grey,) receiving from Lady Mary, before she was queen, good apparel of tinsel, cloth of gold, and velvet, laid on with parchment-lace of gold, when she saw it said, "what shall I do with it?" "Marry," said a gentlewoman, "wear it." "Nay," quoth she, "that were a shame to follow my Lady Mary against God's word, and leave my Lady Elizabeth, which followeth God's word." And when all the ladies at the coming of the Scots' Queen Dowager, Mary of Guise, (she who visited England in Edward's time,) went with their hair frownsed, curled, and double curled, she altered nothing, but kept her old maidenly shamefacedness.

ILLUSTRATIONS OF THE BIBLE FROM THE MONUMENTS OF ANTIQUITY.

No. VIII.

Pottery and Glass Making.

The art of pottery is closely connected with that of brick-making last described, and many allusions are made to the process by the sacred writers. Most of our readers have probably witnessed this interesting operation. A formless lump of clay is placed on a revolving stone; as the wheel turns, a mere touch of the finger suffices to give it shape, the same process hollows the inside and forms the exterior. The simplicity of this plastic process compared with the beauty of the result, suggests a very vivid illustration of the Power which formed man out of the clay; thus Isaiah says, "But now, O Lord, thou art our father; we are the clay, and thou our potter; we all are the work of thy hand." (Isaiah lxiv. 8). The lesson of our dependence on our Creator is also inculcated by a reference to the same imagery. "Woe unto him that striveth with his Maker! Let the potsherd strive with the potsherds of the earth. Shall the clay say to him that fashioneth it, What makest thou? or thy work, He hath no hands?" (Isaiah xlv. 9). A still more remarkable use of this illustration is in Jeremiah, where, under the type of a potter, God shows his absolute power in disposing of nations. "The word which came to Jeremiah from the Lord, saying, Arise, and go down to the potter's house, and there I will cause thee to hear my words. Then I went down to the potter's house, and, behold, he wrought a work on the wheels. And the vessel that he made of clay was marred in the hand of the potter: so he made it again another vessel, as seemed good to the potter to make it. Then the word of the Lord came to me, saying, O house of Israel, cannot I do with you as this potter? saith the Lord. Behold, as the clay is in the potter's hand, so are ye in mine hand, O house of Israel." (Jeremiah xviii. 1—6).

Potter forming the clay.

When the vessels were formed by the potter, they were burned or baked in a kiln. It will be seen from the accompanying engraving, that the fire was kindled at the bottom, and a great heat produced by the draft of hot air through a long and narrow chimney. Several of the vessels were broken in the manufacture, and these, when thrown into a heap, afforded shelter to snakes, reptiles, and disgusting insects, so that the phrase of "being among the potsherds" was frequently used in the East, to signify the lowest degree of degradation. This circumstance may, perhaps, explain a passage, usually regarded as one of the most difficult in the Psalms:—"Though ye have lien among the pots, yet shall ye be as the wings of a dove covered with silver, and her feathers with yellow gold." (Psalms lxviii. 13).

Pottery furnace.

It only remains to be added, that pottery among the Egyptians was a more honourable employment than brick-making, and was not attended with such fatigue and injury to the constitution. The Egyptian potters were eminent for their artistic skill; their vases* are fully equal to the most beautiful specimens of Greece and Etruria; indeed, there is every reason to believe, that both these nations originally derived the art of pottery from Egypt.

One of the most remarkable inventions of a remote era, was the manufacture of glass, with which the Egyptians were acquainted more than three thousand years ago. Of this we have the clearest possible evidence, not only from numerous specimens of the articles themselves, found in the tombs, and among the ruins of the temples, but also from the painted representations of the processes of manufacture, preserved in the same situations, and from which the illustrations of the whole of this series of papers are copied. They were not only skilled in the art of fusing the materials, but also in the use of the blowpipe, an invention so ingenious that its presence alone indicates a very high degree of civilization. The fusion of glass was closely connected with the art of pottery, for many of the vases and fictile ornaments are glazed over with a vitrefied substance containing the proper proportions of the ingredients for making glass. It was generally believed by the ancients that Egypt produced a peculiar species of earth without which glass of the best quality could not be manufactured; it is not easy to discover the nature of this substance from the loose descriptions transmitted to us, but it is said that the beads and ornaments formed from it possessed all the lustre and brilliancy of the diamond. The specimens of Egyptian beads preserved in the different museums of Europe, show that this description is far from being exaggerated. In some of them colours are blended with more exquisite skill than in any specimens of modern art with which we are acquainted; and in others pieces of coloured glass are made to form beautiful mosaics, an art which is now so rarely practised on account of the great difficulty of finding a proper flux for the glass, that many writers have doubted the possibility of the process.

It is singular that glass beads, both round and oblong, were used by ladies in ornamental work so early as the days of Moses just as they are by modern embroiderers. The oblong beads, or as they are usually called, bugles, were strung into a great variety of fanciful patterns. In the Egyptian collection belonging to the king of the French, there is a lady's reticule formed of bugles, whose workmanship is of extraordinary beauty. The sacred beetle is a conspicuous ornament in the centre, and at the sides there are figures of stags, wrought with a life and spirit which could scarcely be expected from such a mechanical process.

The glass manufacturers were particularly skilful in the art of counterfeiting precious stones. Specimens of these are frequently found in the tombs, and we find that the artists were most successful in imitating the rich green of the emerald, and the brilliant purple of the amethyst. This manufacture of false stones seems to have been practised, not so much for the purposes of deception, as with the design of enabling persons in the middle and lower ranks of life to imitate, at a cheap rate, the luxuries of their superiors. The Jewellers in the following engraving are probably employed in preparing some of these factitious ornaments which were no where so common as in Egypt. Mr. Wilkinson, whose valuable and interesting work on the Domestic Manners of the Ancient Egyptians has been published since these papers were commenced, makes the following remarks on this subject:—

* See *Saturday Magazine*, Vol. VIII., p. 32.

Many false stones, in the form of beads, have been met with in different parts of Egypt, particularly at Thebes; and so far did the Egyptians carry this spirit of imitation, that even small figures, scarabæi, and objects made of ordinary porcelain, were counterfeited, being composed of still cheaper materials. A figure, which was entirely of earthenware, with a glazed exterior, underwent a somewhat more complicated process than when cut out of stone, and simply covered with a vitrefied coating; this last could therefore be sold at a low price: it offered all the brilliancy of the former, and its weight alone betrayed its inferiority; by which means, whatever was novel, or pleasing from its external appearance, was placed within reach of all classes; or, at least, the possessor had the satisfaction of appearing to partake in each fashionable novelty.

Such inventions, and successful endeavours to imitate costly ornaments by humbler materials, not only show the progress of art among the Egyptians, but strongly argue the great advancement they had made in the customs of civilized life; since it is certain, that until society has arrived at a high degree of luxury and refinement, artificial wants of this nature are not created, and the lower classes do not yet feel the desire of imitating their wealthy superiors, in the adoption of objects dependent on taste or accidental caprice.

JEWELLERS MAKING GLASS ORNAMENTS.

Though glass was principally used for fancy works, it was also employed in the manufacture of bottles, vases, and other utensils, but especially wine cups. In the later ages, when the Romans conquered Egypt, the use of glass vases nearly superseded those of gold and silver. Indeed, some of them were so exquisitely wrought, that they were more valuable than if they had been formed of the precious metals.

It is said that Alexander the Great was buried in a glass coffin, and there is no doubt that the Egyptian artists could have produced a vitrefied mass sufficiently large for the purpose. But it is more probable that the coffin, or sarcophagus, was only glazed over; because we find that it was not unusual to have a granite sarcophagus after it had been carved, covered with a coating of vitrefied matter, not very different from that used in the manufacture of our common green bottles. This process displayed the sculptures and hieroglyphics carved upon the granite with great clearness, while it preserved their point and finish safe from the injuries of time.

The porcelain of the Egyptians was a species of glass very similar to that invented in modern times by the celebrated Reaumur, who, almost within our memory, discovered the art of working glass into a substance not very unlike china-ware.

From the great beauty of the Egyptian glass-works, they were esteemed very highly in the remote ages. It is distinctly mentioned by Job, who calls it *Zekukith*, a word which our translators have rendered "crystal," because when their translation was made, the antiquity of glass had not been so decisively proved, as in our times. "The gold and the crystal cannot equal it (wisdom)." (Job xxviii. 17.)

The manufacture of caskets and other such articles of combined ornament and utility was very extensive; these, indeed, were, next to the linens and cottons, the most important exports from the valley of the Nile. Some were enamelled, others very elaborately carved and adorned with studs of metal. The peculiar style of ornamental bordering on some of the caskets, and the spirit of the figures portrayed upon them, could scarcely be paralleled even by the best of our modern artists.

ANCIENT EGYPTIAN CASKET.

Connected with this branch of Egyptian manufactures, we may notice the seal-rings, many of which were made of glass, because the impressions could be carved more easily upon this substance than upon stone. Job speaking of the subjection of the earth to the Almighty, says "it is turned as clay to the seal," whence we find that even before the days of Moses, the process of taking impressions upon some soft substance with a seal was so common that it was used as a familiar illustration in a poem, whose date is probably anterior to the invention of alphabetic writing. The seal was worn as a ring upon the finger, or as the ornament of a bracelet; the former custom prevailed every where before the invention of watches, and is not yet wholly disused. In the Bible we find the seal of a king, or of a witness to an important deed, frequently substituted for the sign manual. Thus in the case of a royal decree, we read in the book of Esther, "Then were the king's scribes called on the thirteenth day of the first month, and there was written according to all that Haman had commanded unto the king's lieutenants, and to the governors that were over every province, and to the rulers of every people of every province according to the writing thereof, and to every people after their language; in the name of king Ahasuerus was it written, and sealed with the king's ring." Esther iii. 12. It will be remembered by most of our readers, that recourse was had in England to the same expedient when the increasing disease of his majesty George IV., rendered it impossible for him to affix his signature to papers of state. The seal in Eastern nations, indeed, is still frequently used as a stamp, being rubbed over with ink and then applied to the necessary document. The use of the seal by subscribing witnesses to bonds or deeds is mentioned by Jeremiah: "Men shall buy fields for money, and subscribe evidences, and seal them, and take witnesses in the land of Benjamin, and in the places about Jerusalem, and in the cities of Judah, and in the cities of the mountains, and in the cities of the valley, and in the cities of the south: for I will cause their captivity to return, saith the Lord." (Jeremiah xxxii. 44). The seal was also used, to detect whether any particular door of a box, safe, or building was opened without the owner's permission, and it was also applied to bags for the same purpose. Thus Job, "my transgression is sealed up in a bag, and thou sewest up mine iniquity." (Job. xiv. 17). It seems also probable that documents were frequently sealed up like modern wills, in order that they should not be opened until after a certain specified time. Thus in the visions of Daniel we read that the "celestial

personage" which was upon the waters of the river said to the prophet, "Go thy way, Daniel: for the words are closed up and sealed, till the time of the end" (Dan. xii. 9.); and Isaiah speaks of an obscure prophecy, as "the words of a book that is sealed." (Isaiah xxix. 11.)

The seal of a king was sometimes, as a mark of special favour, imprinted with ink or some other coloured material on the forehead or face of a person appointed to some especial dignity. Thus we read in the Gospel of St. John "Labour not for the meat which perisheth, but for that meat which endureth unto everlasting life, which the Son of man shall give unto you; *for him hath God the Father sealed.*" (John vi. 27.) To this use of the seal there is a more remarkable allusion in the Book of Revelations: "And I saw another angel ascending from the east, having the seal of the living God: and he cried with a loud voice to the four angels, to whom it was given to hurt the earth and the sea, saying Hurt not the earth, neither the sea, nor the trees, till we have sealed the servants of our God in their foreheads." (Rev vii. 2, 3.)

Amulets, *fetiches*, and other instruments of idolatry, were frequently made of glass or porcelain; and hence, in the second commandment, the prohibition is general, "thou shalt not make unto thyself any graven image," after which comes the special prohibition of images, "nor the likeness of anything that is in heaven above, or in the earth beneath." These small images, which were supposed to act as charms, were great temptations to idolatry, and we find that when Jacob fled secretly from Laban's house, that his favourite wife Rachel stole her father's domestic images, which must have been of small size from the ease with which they were concealed. "Now Rachel had taken the images and put them in the camel's furniture, and sat upon them. And Laban searched all the tent, but found them not." (Gen. xxxi. 34). It was probably to prevent this perversion of the glass manufacture, that the inspired lawgiver of the Hebrews did not make use of glass ornaments in the tabernacle, and that no effort was made to introduce the process into Judea.

TASTE FOR READING.

IF I were to pray for a taste which should stand me in stead under every variety of circumstances, and be a source of happiness and cheerfulness to me through life, and a shield against its ills, however things might go amiss, and the world frown upon me, it would be a taste for reading. I speak of it, of course, only as a worldly advantage, and not in the slightest degree as superseding or derogating from the higher office and surer and stronger panoply of religious principles—but as a taste, an instrument and a mode of pleasurable gratification. Give a man this taste, and the means of gratifying it, and you can hardly fail of making a happy man, unless, indeed, you put into his hands a most perverse selection of books. You place him in contact with the best society in every period of history—with the wisest, the wittiest—with the tenderest, the bravest, and the purest characters who have adorned humanity. You make him a denizen of all nations—a contemporary of all ages. The world has been created for him. It is hardly possible but the character should take a higher and better tone from the constant habit of associating in thought with a class of thinkers, to say the least of it, above the average of humanity. It is morally impossible but that the manners should take a tinge of good breeding and civilization from having constantly before one's eyes the way in which the best-bred and the best-informed men have talked and conducted themselves in their intercourse with each other. There is a gentle, but perfectly irresistible coercion in a habit of reading well directed, over the whole tenour of a man's character and conduct, which is not the less effectual because it works insensibly, and because it is really the last thing he dreams of. It civilizes the conduct of men, and *suffers* them not to remain barbarous.—SIR JOHN HERSCHEL.

ADVANTAGES OF A TASTE FOR NATURAL HISTORY.

WHEN a young person, who has enjoyed the benefits of a liberal education, instead of leading a life of indolence, dissipation, or vice, employs himself in studying the marks of infinite wisdom and goodness which are manifested in every part of the visible creation, we know not which we ought most to congratulate, the public or the individual.

Self-taught naturalists are often found to make no little progress in knowledge, and to strike out many new lights, by the mere aid of original genius and patient application. But the well-educated youth engages with these pursuits with peculiar advantage. He takes more comprehensive views, is able to consult a greater variety of authors; and, from the early habits of his mind, is more accurate and more methodical in all his investigations. The world at large, therefore, cannot fail to be benefited by his labours; and the value of the enjoyments which at the same time he secures to himself, is beyond all calculation. No tedious, vacant hour ever makes him wish for he knows not what—complain, he knows not why. Never does a restless impatience at having nothing to do, compel him to seek a momentary stimulus to his dormant powers in the tumultuous pleasures of the intoxicating cup, or the agitating suspense of the game of chance. Whether he be at home or abroad, in every different clime, and in every season of the year, universal nature is before him, and invites him to a banquet richly replenished with whatever can invigorate his understanding, or gratify his mental taste. The earth on which he treads, the air in which he moves, the sea along the margin of which he walks, all teem with objects to keep his attention perpetually awake, excite him to healthful activity, and charm him with an ever-varying succession of the beautiful, the wonderful, the useful, and the new. And if, in conformity with the direct tendency of such occupations, he rises from the creature to the Creator, and considers the duties which naturally result from his own situation and rank in this vast system of being, he will derive as much satisfaction from the anticipation of the future, as from the experience of the present, and the recollection of the past.

The mind of the pious naturalist is always cheerful, always animated with the noblest and most benign feelings. Every repeated observation, every unexpected discovery, directs his thoughts to the great Source of all order, and all good; and harmonizes all his faculties with the general voice of nature.

> ..... The men
> Whom nature's works can charm, with God himself
> Hold converse; grow familiar, day by day,
> With His conceptions; act upon His plan,
> And form to His the relish of their souls.
>
> WOOD.

ON A PEACEABLE TEMPER AND CARRIAGE.

WE are obliged to these duties of humanity, upon account of common interest, benefit, and advantage. The welfare and safety, the honour and reputation, the pleasure and quiet of our lives are concerned, in our loving correspondence with all men.

For so uncertain is our condition, so obnoxious are we to manifold necessities, that there is no man, whose good will we may not need, whose good word may not stand us stead, whose helpful endeavour may not sometimes oblige us.

The great Pompey, the glorious triumpher over nations, and admired darling of fortune, was beholden at last to a slave for the composing his ashes, and celebrating his funeral obsequies. The honour of the greatest men depends on the estimation of the least, and the good will of the meanest peasant is a brighter ornament to the fortune, a greater accession to the grandeur of a prince, than the most radiant gem in his royal diadem.

It is but reasonable, therefore, if we desire to live securely, comfortably, and quietly, that by all honest means we should endeavour to purchase the good will of all men, and provoke no man's enmity needlessly; since any man's love may be useful, and every man's hatred is dangerous. —ISAAC BARROW.

LIFE'S evening, we may rest assured, will take its character from the day which has preceded it; and if we would close our career in the comfort of religious hope, we must prepare for it by early and continuous religious habit.—SHUTTLEWORTH.

ON WRITING MATERIALS.

No. II. The History of Steel Pens.

The first attempt at the construction of Permanent Pens, appears to have consisted in arming the nibs of Turkey-quill pens with metallic points or nibs. As the friction of the quill pen upon the paper, and the softening produced by the ink, are the causes which wear away the nibs of ordinary pens, it is obvious that metal is better calculated to withstand these two influences than quill. But although the metallic nibs greatly increased the durability of the pen, it was at the expense of the elasticity of the quill; and since the durability of the metallic-nibbed pen was not adequate to its additional cost over the common quill pen, this method was soon abandoned.

In our "History of the Quill Pen," we have given a mode of cutting up the quill in the direction of its length, (as practised by Mr. Bramah,) whereby a great many pens could be formed out of one barrel. The object of this process was to prevent pen-mending, an operation which most writers feel to be an infliction.

Pens have been made, from time to time, out of horn and tortoise and other shells. These pens were of course more expensive than common quills, and nearly all of them more durable. Nibs have even been formed, somewhat successfully, of precious stones, the advantage of which is, that they are subject to no wear and corrosion. In 1823 Messrs. Hawkins and Mordan employed horn and tortoise-shell, which were cut into nibs, and softened in boiling water; small pieces of diamond, ruby, and other precious stones were then embedded into them by pressure. In this way were insured durability and great elasticity. In order to give stability to the nib, thin pieces of gold, or other metal, were affixed to the tortoise-shell. Pens somewhat similar were formed by Mr. Doughty; his nibs were rubies set in fine gold. With these pens a person could write as finely as with a crow-quill, or as firmly as with a swan-quill, or the two modes might be combined. These pens possessed considerable elasticity, and by their means an uniform manuscript, unattainable by means of ordinary pens, could be produced. Pens of this construction have been in constant use for upwards of six years, and at the end of that time exhibited no signs of wear, they were as perfect then as ever. In using them, however, care is necessary to preserve the nibs from contact with hard bodies; they require occasional washing with a brush in soap and water. Mr. Doughty states that, although they are costly at first, yet, in the end, they will be found economic, on account of their permanency. To prevent injury to the points, in the act of dipping this pen into an ink-stand, Mr. Doughty lines the interior of his elegant ink-stands with India-rubber, or places a bottle of that material within the stand to contain the ink.

Dr. Wollaston also constructed pens from two flat slips of gold, placed angularly side by side, and which were tipped with the metal rhodium; others have employed the metal iridium; but these pens have been abandoned on account of their expense, and the great care necessary to their preservation. These pens were, however, very durable, though not equal to the ruby nibs.

Many of the pens to which we have alluded, were sadly deficient in that indispensable quality, elasticity. To supply a remedy to this defect, it was proposed to place springs on the backs of such pens, sliding backwards and forwards, to vary the elasticity according to the different hands required in writing. This plan was somewhat successful, but a great objection was, that the ink drying upon the pen, in a great measure neutralized the action of the spring.

Metallic pens appear to have been introduced into various seminaries, from time to time as rarities, among writing materials; they were given as prizes, rewards for merit, &c. But the first mention that we find of *steel pens* for writing, is in 1803, when Mr. Wise constructed barrel-pens of steel, mounted in a bone case for convenience of carrying in the pocket. These pens were very dear, and produced to their inventor but a scanty income. For many years, however, Wise's pens were the only steel pens that could be had, and by means of great activity in "pushing a sale" of them, they were to be had at almost every stationer's shop in the kingdom.

About twelve years ago, the celebrated Perryan pens first appeared. Mr. Perry may be regarded in the light of a great improver; many of his pens are ingenious and original in construction. He arranges his pens into genera and species, advertises their beauties and their merits in prose and rhyme, and has thus, not altogether undeservedly, acquired fame and renown, and, we doubt not, profit, to which, years ago, a mere pen-maker would not have aspired. Mr. Perry first overcame the rigidity complained of in steel pens generally, by introducing apertures between the shoulder and the point of the pen; thus transferring the elasticity of the pen to a position below instead of above the shoulder. This was the object of his patent of 1830. In 1832 further improvements suggested to him the propriety of seeking a second patent, which he obtained for a pen now bearing the odd cognomen of "The Double Patent Perryan Pen." Perry's "Regulating Spring Pen" is furnished with a sliding spring, which increases or diminishes its flexibility, according as it is placed farther from or nearer to the point. In another case, Mr. Perry employs a thread of India-rubber round the nibs of his pens, the yielding of which allows the points to open in proportion to the pressure.

One of the most extensive manufacturers of steel pens is Mr. Joseph Gillott, of Birmingham. This gentleman employs three hundred pairs of hands, and consumes fifty tons of steel annually. Now one ton of steel is sufficient to make about two millions of pens; hence this manufacturer alone furnishes about one hundred millions of pens annually.

The kind of pen made by Mr. Gillott is similar to the original pen by Wise. The improvement of the modern maker consists in employing metal of a better quality, and in a thinner and more elastic state; in making the slit shorter, and in carefully attending to the finish and temper of the metal. These improvements have been attended with such a reduction in price, that a gross is now sold for very little more than was formerly charged for one of Wise's pens.

The common "Three-slit Pen" has long been, and still is, a favourite with steel pen writers. Its peculiarity consists in having a slit on each side of the central slit, the elasticity being thereby much increased.

The nibs of all pens increase in breadth by use, so that steel, as well as quill pens, require mending, or rejecting for a new one. The difference is a question of time, for while a quill pen will increase in breadth in an hour, the steel pen may be used for many days without the necessity of mending or rejection. But steel pens may be mended by means of a fine file or an oil-stone, by which the nibs can be brought to points sufficiently acute for the purposes of the writer; but the present low price of steel pens renders it very questionable, whether the time employed in mending them would not be thrown away.

Mr. Gillott has taken out a patent for an improved

pen, the object of which is to remedy the defect complained of, that the nibs increase in breadth by use. In the new pen, the nibs are made parallel-sided for about one-eighth of an inch long, the remaining portion being cut in the usual curved manner, so that one-eighth of an inch may be worn away without increasing the breadth of the nibs. We have not used any of these pens, but it occurs to us, that by the above means the equable opening and closing of the nib during writing cannot be insured, that the ink would not flow down in sufficient quantity, and that unless the pen were held in one particular direction, the equal wearing away of the nibs would not occur. We should rather fear that the pen would often act the part of a chisel, and dig into the paper instead of moving over its surface; but these objections are offered without ever having used the pen which suggests them.

The oblique position in which the pen is held induced Messrs. Mordan and Brockeden, in 1831, to make their *oblique* pens, in order that the two sides of the nib should bear equally on the paper. The form of this pen is that of a bird's head and bill; the slit, or mouth of the bird, is the part employed in writing, and this slit is inclined, at an angle of 35°, to the general direction of the pen. They hold a great deal of ink, and their use is pleasant to the writer.

Other pens, called *Lunar* Pens, have been adopted. Their under surface being large and concave, a great portion of ink is taken up by them, and thus the writer's time is economized.

Mr. Gowland has invented a pen with an additional nib, called the "Three-nibbed Slit Pen." The additional nib is formed by cutting it out of the shank, and turning it back over the nibs. This pen is manufactured by Mordan, as also "Mordan's Counter-oblique Pen." Both these pens hold much ink, and the awkward appearance of obliquity in the bird's-head pen is removed, while, at the same time, the oblique effects are preserved.

There are many other forms of steel pens, which we need not stop to describe, since the examples already given will afford to the reader a sufficiently accurate idea of their forms and uses. We proceed, therefore, to perhaps the most interesting portion of this article, viz., the processes by which steel pens are manufactured.

The steel with which the pens are made is rolled into very thin plates; it is then cut into slips, about four inches broad and three feet long, then annealed for fourteen hours, and again submitted to the roller; the thickness of these bands is not more than $\frac{1}{100}$th of an inch. The bands are then passed under a stamping-press, and pieces of the proper size for the pens are cut out with great rapidity. These pieces are called *blanks*, or *flats*, and are so cut out, that the fibres of the steel shall run in the direction of the length of the pen. The blanks are now submitted to the action of a hardened steel punch and matrix, of the exact size and shape of the pen, and which are attached to a powerful fly-press. The pens are then softened by being put into an iron box containing tallow; this box is placed in a furnace and equally heated. When the box is withdrawn, the pens are emptied upon hot ashes and covered with the same, and so allowed to cool gradually; by this means they are sufficiently soft for the subsequent processes. They are then marked for the slits; this is done by means of an extremely fine-edged chisel, brought down separately upon each pen, and so admirably adjusted that two-thirds only of the substance of the pen is cut through. The edge of this chisel is finer than any razor, but much harder, because it will perform its office for a whole day without renewing its edge; this superior quality is given to the steel by hammering it for several hours. This is an important fact, and seems to have been discovered by the pen-makers. When the other slits and openings have been made, and the maker's name stamped, the next operation is called *dishing*, by which the proper shape is given to the pens by means of a metallic punch and die, accurately fitting each other, the two being the exact form of the pen.

The pens are now hardened by being heated to redness, and being then plunged into cold oil, which must be at least three feet deep. The oil in a few weeks loses its properties and becomes charred. The next operation is cleaning and polishing; this is effected by a very curious machine. It consists of a tin cylinder, eight or nine inches in diameter, and three feet long, with a hole in the middle of its length, for putting in and taking out the pens, which hole is covered by a lid. This cylinder is hung on joints at each end to cranks, formed one on each of two axles furnished with a fly-wheel, and one of them with a handle. As this latter is turned, the cylinder is thrown up and down and backwards and forwards, and the pens are agitated in a manner similar to materials shaken in a bag. This motion is continued for eight hours, when many thousands of pens, by rubbing against each other, are found to be entirely deprived of any roughness which might have otherwise existed on them, and which, though invisible to the eye, might offer serious impediments to free writing. They are now tempered by being placed on a furnace-plate, and as soon as they have acquired a bright blue colour they are removed; this colour indicates the best temper for the pens, and is due to a thin film of oxide formed on the surface; were they heated in vacuo, or in any medium containing no oxygen, the blue colour would not appear. The last operation consists in cracking the slits, which is done by pressing the nibs suddenly with a pair of pincers; the slit, which was cut only two-thirds through, then suddenly opens.

It is calculated that the total quantity of steel employed in this manufacture, amounts to 120 tons per annum, from which upwards of 200,000,000 of pens are produced.

There is, however, a considerable waste of material in this branch of art. The pieces of steel cut out of the pens cannot be applied to any use; it is so thin that it cannot be welded, and it cannot be melted, because it takes fire and burns, in consequence of access of air between the thin pieces.

It is a cheering statement, that in spite of the immense consumption of steel pens, the demand for quills has not abated, but, on the contrary, is on the increase. This is to be accounted for by considering that, within the last few years, population has greatly increased, and that by the diffusion of the refining influence of education, that class of persons now can write which twenty years ago was altogether illiterate. Besides this, the Continent and America are supplied by us with steel pens. When first introduced, they were as high as 8*s.* per gross, then they fell to 4*s.*, and now they are manufactured at Birmingham at so low a price as *four-pence* per gross! As yet, it appears that the only branch of trade that has suffered by the introduction of steel pens is the cutlery trade: pen-knives are in less requisition than formerly.

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THE STORY OF

MASANIELLO, THE FISHERMAN, AND THE REVOLUTION OF NAPLES.

CHILDREN OF THE NEAPOLITAN LAZZARONI.

PART THE SECOND.

JULY 8th.—The morning of Monday had scarcely dawned, when licentious bodies of rioters appeared parading the streets, renewing the scenes of the former day with tenfold violence. In this, as in every other instance of a popular outbreak, it was found that the disposition to riot, like every other evil principle, is greatly strengthened by indulgence, and that the calamities of licentiousness accumulate with frightful rapidity. The Duke of Arcos resolved to negotiate, and he employed a Neapolitan nobleman, the Duke of Matalone, whom he held at the time as a prisoner in the castle, to act as his mediator with the insurgents.

No more puzzling question could be put to the Neapolitans, than to ask what was the substance of their demands. The expectations of a mob are always vague, and hence they insist upon impossibilities. The leaders of the insurrection demanded not only the abolition of all imposts, but the production of a charter, written, as they said, in letters of gold, and granted by the Emperor Charles the Fifth, to the citizens of Naples. No such document had ever existed, but nothing short of a miracle could convince the multitude of their delusion. Masaniello averred that it had been supernaturally described to him, and this declaration rendered further evidence superfluous.

The viceroy under these circumstances endeavoured to palm on the populace a forged document similar to that which they required. There had not been sufficient time to give such a fraud even a chance of success; it was at once detected, and popular indignation was directed against the Duke of Matalone. The fiercer insurgents seized on his person, loaded him with chains, and dragged him to prison.

Masaniello's malady had been aggravated by a sleepless night; he incited his followers to fresh acts of violence, and begun to display a fierce hatred of the nobility and gentry. With his sanction, the houses of all who were regarded as enemies to the people, were gutted and destroyed; his followers, the lowest and most licentious of the Lazzaroni, paraded the streets with boat-hooks to drag the gentlemen from their horses, and inspired such terror, that the appearance of one of them was sufficient to clear a crowded street. The very women joined in these excesses, with muskets on their shoulders, swords by their sides, and daggers in the folds of their dress; and even the children were made to bear their part in the national frenzy. A second night of revolution closed in, and the results of the

tyranny of a mob were traced in characters of blood and flame on the once lovely city of Naples.

July 9th.—The excesses of the former days were renewed with fresh violence. Masaniello led a body of his followers against the steeple and church of St. Lorenzo, which had been garrisoned by a company of Spanish soldiers, who were too few to offer any effective resistance. Henceforth, the church of St. Lorenzo became the chief focus of the insurrection, and its great bell was used to sound the tocsin, whenever Masaniello and his successors deemed it necessary to summon an assembly of the people. In the evening of the day, the viceroy made a new effort to open a negotiation with the insurgents, employing as his ambassador Cardinal Felomarino, Archbishop of Naples, who was rather a favourite with the populace. He persuaded the people and their leaders that he had full power to arrange all the points of difference, and he produced copies of the charters granted by Ferdinand the Catholic, and Charles the Fifth. Though these documents contained nothing like the stipulations ignorantly expected by the multitude, they were received with satisfaction, and the night was passed more peacefully than either of the preceding.

July 10th.—The expectations of peace to which the cardinal's embassy had given rise, were disappointed by a new series of events. Large parties of banditti, which had long infested the kingdom of Naples, flocked to the capital, and were gladly received by Masaniello. To one of these criminals, by name Perrone, he intrusted the charge of the prisoners. But the Duke of Matalone found little difficulty in persuading the bandit to become a traitor to the popular cause, and to join with another bandit, named Palombe, in a plot for the assassination of Masaniello. As a preliminary, the duke was permitted to make his escape, and he took good care to remove himself to a safe distance.

Masaniello summoned a general assembly, to deliberate on the proposals made by the cardinal; an immense multitude thronged into the square appointed for the meeting; but the appearance of five hundred banditti, armed to the teeth, well mounted, and acting in concert, excited some alarm. They rode forward to the place where Masaniello stood; some exclamations from the crowd excited his alarm, and he commanded the bandits to dismount. Instead of obeying the order, seven of them discharged their carbines at him, but though his shirt was burned by the gunpowder, not a ball struck him. The enraged mob immediately assailed the bandits; thirty of them fell at the very first discharge, and the rest sought shelter in a church, trusting that the Neapolitans, who are proverbial for superstition, would respect the sanctuary.

But in the terrible excitement of popular fury, religion ceases to curb violence, and superstition is of course still more inefficacious. The enraged multitudes forced the gates, the work of butchery went on in the sacred precincts, the floor was flooded with blood, wretches were slaughtered while they grasped the altar, and the images of the Virgin and the Saints were stained with the gore of the victims. A few were reserved for a worse fate; they were tortured to force a confession; cords were drawn round their thumbs, and tightened until blood spouted from the nails; the heads of others were subjected to similar compression until their eyes were starting from the sockets: they confessed the plot that had been laid for the murder of Masaniello, and the intention of their masters to fall upon the mob during the confusion that must necessarily result from the loss of the popular leader. All agreed that the Duke of Matalone and his brother, Don Joseph Caraffa, were the contrivers of the conspiracy; but some, probably in the vain hope of preserving their lives, added many other horrors, declaring that a plot had been laid for undermining the place of assembly, and blowing all the insurgents together into the air. These revelations scarcely delayed their fate, as each told all he was supposed to know, he was hewn down, beheaded, and mutilated in barbarous triumph.

The assembly still continued its meeting; Masaniello, guarded by the most ferocious of the Lazzaroni, bearing on pikes the gory heads of the slain banditti, harangued the multitude, exaggerating the dangers from which he and they had escaped, and calling for vengeance on the whole body of the nobles.

Horrid outcries rent the air as he concluded; a party instantly departed in search of the duke and his brother, while others, in anticipation of their capture, hastily prepared a wooden scaffold; the bleeding bodies of those who had been slain were tied to the tails of horses and dragged through the streets; the fishermen, the Lazzaroni, and hordes of degraded women, incensed by fury, mutilated the senseless carcasses, while children wallowed in the blood, and seemed to take a premature delight in slaughter. Matalone escaped his pursuers, but Caraffa was taken and dragged towards the square. His captors could not delay their eagerness for his blood, and, before he reached the scaffold, a butcher struck off his head with a blow of a cleaver. When intelligence of this event reached Masaniello, he ascended the scaffold, still in his sailor's dress, with a drawn sword in his hand, and exclaimed, "Bring here the head of the traitor." His orders were obeyed, and the furious demagogue insulted and spurned the corpse of the unfortunate nobleman, until his own followers could not conceal their feelings of disgust.

During this dreadful day the Neapolitan clergy kept the churches open, covered the altars with the ornaments used in the services for the dead, offered up prayers for peace, and repeated the service of their church called "supplications for the passing soul," usually recited for persons at the point of death. Even this spectacle failed to produce the intended effect; murderers with their weapons of slaughter, incendiaries waving their blazing torces, stopped at the gates of the churches as they passed, uncovered their heads, knelt for a few moments to go through the mummery of devotion, and then went on their way to continue the work of destruction.

July 11th.—The Duke of Arcos was far from breaking off the negotiations in consequence of the preceding horrors. Cardinal Felomarino again presented himself as a mediator; Masaniello, who was unable to write, dictated to his secretaries certain conditions for peace, principally insisting on the total abolition of taxes, and full indemnity for all who had engaged in the insurrection. When the articles were prepared, they were read to the people in the church of the Carmelites, and received with loud acclamation. Cardinal Felomarino then proposed that Masaniello should accompany him to the Spanish governor; the proposition was adopted, and the demagogue exchanged his sailor's dress for a superb robe of silver tissue. He then mounted a splendid charger, richly caprisoned, and, accompanied by a vast multitude, proceeded to the viceroy.

The Duke of Arcos, though imbued with a double portion of Spanish pride, received the imperious fisherman with the utmost respect, and treated him as if he had been the first of the grandees. The courtly ceremonies were tedious; they were pro-

tracted to such a length, that the crowd which waited outside for Masaniello's return, began to get alarmed, and to show symptoms of suspicion and uneasiness. On hearing this Masaniello stepped to the window, and by a single word hushed the miscreants to silence. He took the opportunity of showing to the viceroy the wonderful and perilous influence which he had established over the populace by manifesting their immediate and implicit obedience to his commands. He gave a signal with his hand, and instantly all the bells in the city began to toll; he waved his hand once more, and their knell instantly ceased. He lifted his arm, and the multitude raised deafening shouts; he placed his finger on his lips, and the assembled thousands became mute and motionless as statues. Such an exhibition produced the designed effect; the viceroy felt it necessary to recognise the title of so potent a demagogue; he not only saluted him as captain-general of the populace, but placed a gold chain round his neck with his own hands, and proclaimed him Duke of St. George.

July 12th.—The hopes of peace were baffled by the increasing malady of Masaniello; he was haunted by a morbid terror of death, dreading particularly the banditti, and the nobles by whom he believed them to be instigated. He could only sleep for a few minutes at a time, keeping his attendants in constant excitement, by springing from his troubled slumbers and exclaiming, "Up, up, there can be no rest for us until we are masters of Naples!" He received food only from the hands of one of his relations, and he frequently expressed a belief that he would eventually be deserted by the fickle populace, ignominiously slain, and that his body would be exposed to insults as gross as those which had been offered to the remains of Caraffa. Agitated by these apprehensions, he no longer received applications and petitions in the market-place, but posted himself at the window of his own cottage, in his fisherman's dress, with a loaded blunderbuss at hand. A body of the Lazzaroni surrounded the house as guards and executioners of his will; two secretaries prepared his answers, sentences, &c., and in all of these Masaniello continued to manifest an implacable hatred of the aristocracy.

July 13th.—The business of this day was the installation of Masaniello in the cathedral, and the solemn ratification of the articles of peace arranged between him and the viceroy. During the ceremony the marks of Masaniello's madness first became obvious to the spectators; he frequently interrupted the reading of the articles by captious and even absurd objections; at the conclusion of the ceremony he was with difficulty restrained from throwing off his robes, and assuming his old dress in the presence of the whole assembly. The multitude, however, still adhered to him, and their acclamations succeeded for a time in restoring his equanimity.

July 14th.—The insurrection had now lasted a week; a second Sunday had dawned, and the distractions of Naples seemed to have become worse than ever. Masaniello's insanity now began to be manifest to the multitude; he galloped through the streets half-naked, invited the cardinal and the Duke of Arcos to sup with him, jumped into the sea with his clothes on, continued to swim about for an hour, and drank at supper twelve flasks of strong wine. The intoxication which ensued, produced the only sound sleep he had enjoyed since his elevation.

July 15th.—Insurrectionary violence was now beginning to grow weary of its own excesses. The populace had nothing to do; for all who could be regarded as enemies of the public cause were removed. Masaniello's insane freaks, sometimes ludicrous and always mischievous, tended greatly to abate the popular enthusiasm in his favour; a new conspiracy was formed for his destruction, in which many who had been his most ardent supporters were included. His despotic power, which he frequently manifested by various acts of tyranny during the day, seemed still too formidable to be resisted. But towards evening he drew his sword, cut furiously at all around him, and became so outrageous that his friends were obliged to bind and secure him during the night.

July 16th.—Early in the day Masaniello escaped from the friends who detained him in custody, and rushed into the church of Del Carmine, during service before a crowded congregation. When the solemnity was concluded, Masaniello ascended the pulpit with a crucifix in his hand, harangued them in a desponding mood, complaining that he was betrayed and deserted. As he grew warm with the fervour of discourse, his insanity began to break out; at length his language and his gestures became so outrageous that the priests removed him by force from the pulpit. He then applied to the cardinal for protection, offering to resign all his authority to the viceroy, and the prelate persuaded him to retire into an adjoining cloister. The conspirators soon burst into his place of refuge, exclaiming, "Health to the king of Spain and death to Masaniello!" For a moment his former energies were rallied; he turned round to the assassins, and in a tone of firmness exclaimed, "Do my faithful subjects seek me? Here I am." The words had scarcely passed his lips when he received the fire of four muskets in his bosom; he had only time to exclaim, "Ungrateful traitors!" as he fell. He was a dead man ere his head touched the earth.

The crowded congregation, in the church of Del Carmine, learned the fate of the popular favourite without emotion. Those who had followed shouting in his train on the preceding day, patiently stood by while his head was cut off to be borne as a trophy to the viceroy. His body was dragged through the streets by a rabble of boys, among whom the nobility freely flung pieces of money, and was then cast into one of the city ditches.

July 17th.—The death of Masaniello does not conclude his "strange eventful history." On the morning after his murder a vast crowd of the Lazzaroni assembled, sought out his dishonoured remains, and carried them in melancholy procession to the cathedral; there his body was arrayed in royal robes, decorated with a crown and sceptre, and treated with all the respect due to a deceased sovereign. His funeral was celebrated with the utmost pomp; thousands of armed men followed the hearse, testifying their respect and sorrow; as the body sunk into the grave the assembled multitude burst into a passion of tears, prayers, and lamentation, and the memory of the unfortunate fisherman was long held in the highest veneration by the mob of Naples.

Thus, in the short space of ten days, Masaniello was raised from indigence and obscurity to the height of power; then suddenly slain as a wild beast and dragged through the city with ignominy, yet finally buried as a prince and almost worshipped as a saint.

The civil war soon broke out afresh, but the Neapolitans, after their first enthusiasm had cooled, proved unable to resist the might of the Spanish monarchy. Torn in sunder by internal tumults, insulted by their leaders, betrayed by their favourites, and plundered by banditti, they were glad to purchase peace upon any terms, and to submit to a government still more oppressive than that against which they had taken up arms.

HISTORY OF THE OLIVE TREE, AND THE MODE OF PREPARING THE OIL.

No. II

THE *cultivation* of the Olive has always been particularly attended to by the husbandmen of Western Asia and Southern Europe. It was formerly, and at the present day, propagated both by cuttings and by grafts; the latter method is referred to at some length in Romans xi. 17—24.

There was a law at Athens that the Olive-tree must be planted nine feet from another man's ground, because it is said to spread its roots further than other trees.

Virgil, describing the various ways which Nature has ordained for the propagation of trees, says, that Olives are increased by truncheons, that is, by cutting or sawing the trunk or thick branches into pieces of a foot or a foot and a half in length and planting them; whence a root, and soon after a tree, was formed. He goes on to express his astonishment at their great vitality:—

> E'en stumps of Olives, barred of leaves and *dead*,
> Revive, and oft redeem their withered head.

In another place, he says, that these trees,

Unlike vines, when once they have taken root and braved the winds, require neither pruning-hooks nor rakes; the land itself, after being ploughed, affords sufficient nourishment, and so productive are the plants that it would almost seem as if the fruit in full maturity were really turned up by the ploughshare.—*Georgics*, II. 420.

But little alteration has taken place in its culture. It is still propagated by grafts, or by suckers and truncheons, and it is still the custom to deposit stones in the trenches for encouraging moisture about the roots, as described by Virgil.

Its successful cultivation may be taken as no uncertain test of the industry and security of the country that produces it; its delicate constitution, if the term may be allowed, and the long period that must elapse before it will bear fruit, demands all the care and patience of the labourer. If once the original stock is destroyed, as frequently happens during a war, a whole generation must pass away before the new plants come to maturity, and unless property is protected and the labourers have some interest in the soil, it may not be reproduced for centuries. Under the paternal government of Greece it is daily adding to the riches of the country, while in Egypt it has gradually disappeared, nor have they been able to revive its cultivation. "Of many thousand young Olive-trees," says Prince Puckler Muscau, in a recent letter to this country, "which Ibrahim Pasha caused to be distributed gratis some years ago, hardly one remains, because they were carelessly planted and still more carelessly looked after."

The Olive, in the Western world, (says Gibbon,) followed the progress of peace, of which it was considered as the symbol. Two centuries after the foundation of Rome, both Italy and Africa were strangers to that useful plant; it was naturalized in those countries, and at length arrived into the heart of Spain and Gaul. The timid errors of the ancients, that it required a certain degree of heat, and could only flourish in the neighbourhood of the sea, were insensibly exploded by industry and experience.

The Olive grows readily in our own country by cuttings, or it may be grafted on the privet.

With protection during frost, (says Mr. Loudon,) it may be maintained against a wall in the latitude of London. Some trees so treated produced a crop in the garden of Camden House, Kensington, in 1719, and in Devonshire some trees have stood the Winter for many years, as standards, though without ripening their fruit. Large plants are frequently imported from Genoa along with orange and pomegranate trees.

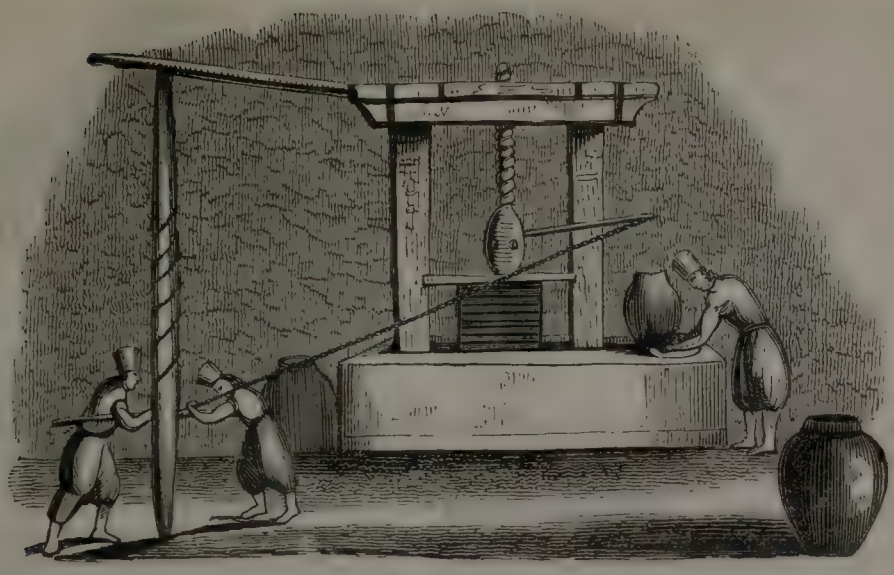
This subject affords an opportunity of saying a few words upon the mutual action and reaction of vegetable upon animal, and of animate upon inanimate matter. By tracing the food of animals through all its conditions, we find that no substance or being is isolated or self-dependent—that the same element is gradually developed from inert matter to vegetable life—from vegetable to animal life—and that its apparent death is merely its transition from one condition to another. It was observed by a native of Marseilles that the Olive, in its wild state, is propagated by kernels that have undergone the digestive process of animals, and more particularly of birds. It was further observed that, by this process, the fruit was deprived of its natural oil, and thus rendered permeable to the moisture of the soil, the excrement of the animal at the same time serving for manure, and probably the soda which that contains, by combining with the portion of the oil that has escaped digestion still further ensuring germination; the continuance of the species being thus produced by the very means that would seem to have destroyed it. The digestive process is so powerful, that, "some physiologists," says John Hunter, "will have it, that the stomach is a mill—others, that it is a fermenting vat—others again, that it is a stew-pan—but in my view of the matter, it is neither a mill, a fermenting vat, nor a stew-pan—but a stomach;" its action, however, is so powerful, that the handles of knives swallowed by jugglers have been dissolved, and the edges of the blades been acted upon by the gastric juice; yet the principle of life in the kernels of the Olive is still more powerful, resisting all chemical action except that which is favourable to germination *.

Olive oil was, perhaps, the first, certainly the *chief object of the early commerce of the Levant.* As vast quantities of it were made by the ancient Jews, it became an article of exportation. The demand for it in Egypt led the Jews to send it thither, and the prophet Hosea, xii. 1, upbraids his degenerate nation with the folly of their conduct, when, in the decline of their national glory, they carried the produce of their Olive-plantations into Egypt as a tribute to their ancient oppressors, or as a present to conciliate their favour, and obtain their assistance in the sanguinary wars which they were compelled to wage with the neighbouring states.

It was also carried into Egypt by the Greeks; Plutarch tells us that Plato defrayed the charges of his travels by selling oil in Egypt.

The relative value of this tree, as compared with other productions of the soil, may be seen by the oath which the Athenian youths were required to take at the age of eighteen. "My endeavours to extend the dominions of Athens shall never cease while there are wheat, barley, vineyards, and olive-trees

* One more instance of the reaction that animals exert upon vegetable life. The formation of the finer soils immediately upon the surface of lands is chiefly to be attributed to the digestive process of the common earth worm. Swallowing with its food a considerable quantity of earth below the ground, it deposits this upon the surface in a state admirably adapted for vegetation. This little gardener "earths up" the delicate roots of plants from which the mould has been washed away by rains, and is continually preparing a fresh soil to receive their seeds. It has been lately proved by actual observation, that the superficial stratum of a field is entirely changed in this manner every few months, and that pieces of pottery that have been thrown away as rubbish, are buried, in the course of a few years, to the depth of several inches. There is no room left to adduce other examples, but it requires no painful labour to follow nature ourselves through this or any of her paths: it is true that we have no opportunity in this country of observing whole reefs of rocks, secreted by one class of animals as bone is secreted in the human body. (see *Saturday Magazine*, Vol. III., p. 219,) and the surface of these rocks broken down into a rich and impalpable mud by another class, both lower in the scale of creation than the common earth worm. But there are changes going on before the eyes of all, so beautiful and yet so simple, that it seems strange that our attention is not more frequently arrested by them—and seeing them, that our minds can remain insensible to the perfect wisdom they evince.



THE OLIVE PRESS.

without its limits." At Athens there was a separate market called the "oil market," and a small trade was carried on in the fruit itself, for, according to a law in force, "all olives are exportable, but other fruits are not; so that the archon shall openly curse the persons that exported them, or else be fined 100 drachmas," (*3l. 4s. 7d.*)

The oil and unripe fruit in a pickled state are chiefly brought to England from Languedoc, Leghorn, and Naples; the best oil is from Leghorn, and the best pickles from Genoa and Marseilles. The Ionian islands are very rich in oil. The average product of the harvest of Zante is from 4400 to 4500 barrels, and that of Corfu in 1835 was reckoned at 80,000 or 100,000 barrels, and was valued at 2,000,000 dollars; but it must be observed that the trees bear well only every second year, and 1835 was the productive year.

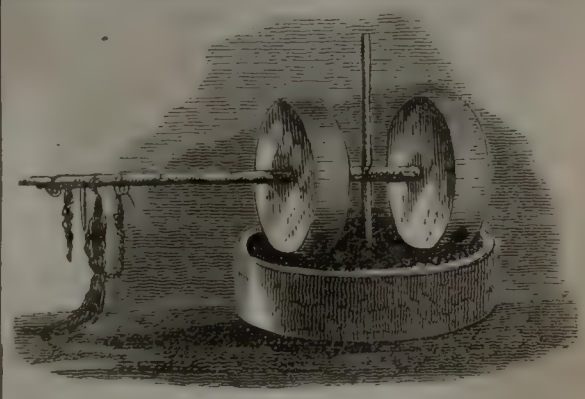
Strangers visiting the Ionian islands in Autumn are apt to think that currants are the chief produce, as at that time the whole of the country is engaged in the currant harvest, and the ports are crowded with vessels anxious to obtain the first fresh fruit. The trade in oil, however, is the most valuable, but as it is carried on constantly, and the oil is quietly embarked all the year round, it does not come so directly under the notice of strangers.

The process of expressing the oil is very interesting. Before the invention of mills it was obtained by pounding the fruit in a mortar; in Exodus xxvii. 20, we read of "pure olive-oil beaten for the light." It was also obtained by treading them with the feet in the same way as they crush grapes in many places at the present day, as at Xeres in Spain for our sherry wine; so in Micah vi. 15, "Thou shalt tread the olives;" but the feet appear to have been armed with metallic shoes; "Let him dip his foot in oil; thy shoes shall be iron and brass."—Deut. xxxiii. 24, 25.

To illustrate the preparation of oil, as it is carried on at the present day, we shall conclude with a description of some Olive-mills at Athens.

About half a mile from Athens, on the road to the port, and on the skirts of the great Olive-grove, are a row of low cottages built of mud, but not ill-looking, in which may be seen the rude and simple machinery which constitutes their olive-mills. They commence work about the beginning of November. Some of the fruit falls of itself before the season commences, and is either trodden under foot or washed away by the rains; but when there is a sufficient quantity ripe, the trees are well beaten, and the Olives are picked up from amongst the grass by women and children, and collected into small sacks. These are balanced on each side of an ass or mule, and carried at once to the proprietor of the mill, with whom the fruit is bartered for a certain quantity of oil. The proportion of fruit for oil depends upon the abundance of the harvest, and the period of the season; the fruit that is first gathered being dry, and unproductive compared with that collected later in the season, which swells even till it bursts, and lets the oil run away. At the beginning of the season of 1835, 28 occas* of fruit were exchanged for 5½ occas of oil, or nearly three gallons; but later in the season, only 24 occas, or even less, were given for the same quantity. The weighing of the little sacks as they come in is not the least curious part of the ceremony. The countryman not placing implicit confidence in the master of the machines, invariably brings his own scales with him, while the latter pays the same deference to the honesty of the other by weighing a second time with his scales, and it is not considered etiquette for the buyer to stand very near the sack for fear he should be tempted to give it a slight lift upwards with his foot. One sack weighed 53½ occas, and another after that 46½ occas.

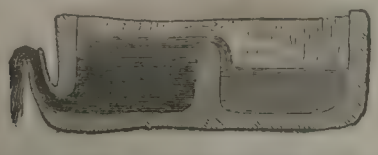
The fruit is now shot out into a large square bin, in a corner of the building, like wheat in a granary, and close to this bin is the little mill for crushing



the Olives,—if one upright stone, attached to a perpendicular beam, deserves that name. These ma-

* An occa measures three pints and a half, and weighs about two pounds and a half.

chines are of two kinds, the one in common use has only one stone attached to a perpendicular beam which rotates with it. A horse is attached by traces to a horizontal pole which runs through the centre of the stone, and to a stick on the other side by a rein ingeniously tightened, so that the horse most unwillingly pulls itself along when once the machine is set in motion. The improved machine has two smaller stones further removed from the central beam, which does not rotate with them, but is made fast to the roof of the building. These are much more effective than the other as they describe larger circles, but require more moving power. The object of the mill is only to crush the Olives, no oil whatever being expressed. A sufficient quantity of fruit being thrown in from the bin at hand, the machine is set in motion, and a man goes before the horse, with a long pole armed with iron, to push the fruit in the path of the wheel. After a few rounds, about two gallons of boiling water is poured in to assist the action of the stone, and more added as required, till the whole mass acquires the consistence of a coarse paste. It is now put into a large jar and carried to the press, where one of the men kneads it with more hot water into a thinner paste, and as often as he fills the shallow dish before him, empties it upon a square cloth of the same coarse and thick material as the capotes or cloaks of the country, and of such strength as to bear the greatest power of the press without bursting. Another man immediately forms the paste with his hands into a square flat mass, folds up the cloth neatly, ties it with a string attached to each, and places it in the press before him, and so on to the number of sixteen or seventeen. The press is now turned down by means of a hand-lever, and when more power is required, a rope is carried from the lever to an upright rotary beam at some little distance, which two men turn round with great rapidity; this part is very amusing. The men make it rather a sport than work, and there is almost a snake-like elegance in their large half-clad and swarthy limbs, as they chase each other round the central beam with extraordinary velocity. The effects of their labour are soon seen. The oil and water run down the sides of the pile of cloths in crimson rivulets into the trough before the press, which, though rudely hewn out of one log of wood, is constructed upon the knowledge of the relative specific gravities of oil and water. It is divided into two parts by a partition that does not come to the top of the trough, but is about two inches below the level of the sides, so that when the oil and water run together into one part, it allows the oil, which is lighter than the water, and consequently floats on the surface, to flow over into the other division of the trough, while the water sinks to the bottom and is conveyed away by a pipe carried upwards on the outside, to the level at which they wish to maintain the water within the trough.



When the press is screwed down as far as possible, it is loosened; hot water is thrown upon the pile to wash off any oil that may remain upon the cloths, which are now removed and the paste within kneaded, but without unfolding the cloths. More boiling water is poured upon each, and they are again placed in the press, to be again removed to undergo for a third time the same operations, till no oil remains. In this manner twenty-eight occas of fruit produce eight, nine, or ten occas of oil. *The water* takes up most of the colouring matter of the fruit, and flows away from the cottages like rivulets of blood, dyeing the ground for some little distance of a deep and beautiful crimson. *The refuse of the fruit* comes from the press in square hardish masses, that are placed before the fire, where they soon become quite dry, and serve for fuel to heat the water that is so constantly required in the various processes. *The oil*, which is of a beautiful light-green colour, is removed from the trough into a large jar close to the press, and after depositing any water or dirt, is poured into skins, having the hair upon the inside. These are weighed before being carried away to the proprietor's house; a common sized one weighed sixty occas. At the proprietor's house it is poured into large earthenware jars, four or five feet in height, which are let into the ground, so that the short necks are alone seen above the surface. Here it remains for at least two months, till all impurities are deposited, but it still retains a greenish colour, never seen in the oil consumed in England, and which makes it less offensive to the prejudices of those unaccustomed to its use, as it appears more like, what it really is, an agreeable vegetable juice, rather than a gross animal oil.

Sometimes the supply of oil falls short, as was the case in November, 1835, when there was scarcely any old oil to be purchased in or near Athens. In November, 1834, the old oil sold for one drachma (rather more than 8½*d.*) an occa (3½ pints), but at the same time in the following year, the same quantity could scarcely be bought for 2⅛ drachmas (about 1*s.* 8¾*d.*) The presses were consequently crowded with purchasers, but the new oil is almost unfit for the purposes of burning, as it gives a most wretched light.

To keep a press and mill in constant work, to receive the fruit, send away the oil, and attend to the coppers for boiling the water, requires six men. These are paid in oil; it is, in fact, but one continued series of bartering, fruit for oil, and oil for labour, till the produce is carried into the city to be retailed, but the oil being of universal use makes it a most convenient medium of exchange.

The above description answers to the method by which oil is prepared in all parts of Greece and the Ionian Islands, and does not materially differ from the same operations as performed throughout Southern Europe.

The fresh ripe fruit eaten with bread is by no means unpleasant, and when preserved by being sprinkled with salt, is almost the only food allowed to the poorer Greeks during Lent. The oil too enters into all their dishes, nor are they satisfied with it in the pure inodorous and nearly insipid state that we obtain it in this country, but prefer it, especially the lower classes, after it has acquired a rank odour and rancid taste. I have known Greek servants, when offered fish that had been fried in fresh oil, to suit the fastidious palate of an Englishman, refuse to eat it until they had given it a flavour, by cooking it over again with their own rancid oil; but the decided preference that, under similar circumstances, a Chinese would show for *castor oil* is still more peculiar. It is, however, to be regretted, that a prejudice against pure olive oil exists at our own tables, for, when taken in small quantities, especially with vegetables, its use is as natural, and its effects as salutary, as those of melted butter are artificial and pernicious.

G. F. F.

THE SEASONS.

I. Winter.

The changes of the seasons, and the varied phenomena consequent thereon, is a subject well deserving the most patient investigation. We believe, however, that there is no department of human knowledge, interesting and instructive as it is, respecting which a greater degree of error prevails. Almost everything relating to the weather, to the alternations of heat and cold, to the origin of dew and rain, hail, snow, frost, and storms, is encumbered with popular errors. Many of these errors are of great antiquity, and may be traced to defective information respecting what, in the present day, are considered some of the most simple laws of nature. Other errors originated in the absurd rites and superstitions of idolatry; whilst a third class, and that probably the most numerous, is the offspring of the pretended science of astrology, which, to the credit of the present times, is rapidly falling into the contempt it always merited.

As most appropriate to the period of the year in which we are writing, we shall endeavour to explain some of the causes and the effects of the atmospherical changes commonly incident to Winter, which by their constant recurrence are rendered familiar, but which on that very account are probably less attentively studied, and less perfectly understood than other phenomena which happen at longer and more uncertain intervals.

First of all, let us notice the lowness of temperature, or *the coldness of the weather*, which is the most remarkable characteristic of Winter.

There is no fact in philosophy more satisfactorily established, than that the atmosphere which surrounds the earth, is the medium through which the Creator and Preserver of the universe displays the ordinary operations of his providence towards that portion of his dominions, which is allotted to man for a temporary habitation. The air, in which, as in a seamless garment, our planet is enveloped, and which accompanies it in its diurnal and annual revolutions, is generally supposed to be about 45 miles in height. This elevation, great as it may appear when compared with that of our highest mountains, or the greatest altitude attained by the balloon, ($4\frac{1}{4}$ miles,) is not equal to one-eightieth part of the earth's semi-diameter. If we suppose the dark line in the annexed figure to indicate a part of the earth's surface, the faint line will denote the extreme limits of the atmosphere as already mentioned, the proportions being about one-twentieth of an inch on a globe of eight inches in diameter.

It can hardly be doubted, that the sun (independently of its heating and light-giving properties,) the moon, the planets, and comets also, exercise some kind of influence upon our globe, which, as we may reasonably imagine, bears a direct proportion to the relative sizes, distances, and movements of the respective bodies. But it is difficult, if not impossible, to determine what is the precise character of the mutual influences which we suppose to subsist among the members of that system to which the earth belongs. Nor ought this to be matter of surprise. We may rather wonder that so much *is* known, respecting bodies so remote. By the aids of modern science, the sizes, distances, and periodical revolutions of the planets, and their attendant satellites, have been ascertained with almost incredible accuracy,—an accuracy which has no parallel in the computations of time, and distance, and magnitude, which occur in the ordinary affairs of life.

The moon, as being our nearest neighbour in the regions of space, has in all ages been an object of peculiar interest and of unwearying observation; giving occasion, however, to opinions so wild and chimerical, that we find it difficult to believe in the sanity of those by whom they were promulgated. It is unquestionable that the moon exercises a specific influence over the atmosphere and the ocean; but it has also been asserted, and is very generally believed, that its influence is equally extraordinary upon the animal creation; and particularly upon the bodies and minds of mankind, those affected by mental derangement having thereby acquired the name of lunatics.

There are some very curious facts connected with this subject; respecting which, however, it must be confessed that our knowledge is exceedingly limited. The most we can do is carefully to note the effects; the cause is at present veiled in uncertainty. From the testimony of those who have paid attention to such matters, it would seem that the moon-beams possess a cold-producing agency. In France it has been noticed that so late in the Spring as April and May, the leaves and buds of plants, exposed to the full moon, on a clear night, have been frozen, whilst the temperature of the surrounding air has been several degrees above the freezing point. In warm climates, and especially on board ship, instances have frequently occurred, where persons who incautiously, or through ignorance, have slept in the open air with the face exposed to the moon's rays, have had their muscles distorted, their mouths drawn awry, and their sight seriously injured. In some cases these effects have remained for several months; and in others, the individuals thus exposed, have sustained a temporary loss of reason; resembling those labouring under the stupefying effects of narcotic poisons.

It ought to be known that fish, which are hung out of doors to dry, if placed in moon-light are thereby rendered unwholesome. It may not be so in every case; but on several occasions we have witnessed the most alarming symptoms result from eating fish which had been so exposed. One case we remember in which a whole family, consisting of six persons, was placed in imminent danger from the cause just mentioned.

Many other effects, equally remarkable as those referred to, and which are supposed to depend on the moon's influence, could be enumerated; but these hints must here suffice.

It has been stated that the periodical changes peculiar to the different climates of the earth, are effected through the agency of the atmosphere; but in this important work it performs only the part of an auxiliary; the sun, as the source of light and heat, being the primary cause of those changes.—And let it not be supposed that the relative intensity of the sun's rays, or, in other words, their heating property, as experienced at different periods of the year, is occasioned by the earth's nearer approach to, or greater distance from, the sun. Strange as it may appear, the earth, during the period of Winter in this country, is many millions of miles nearer the sun than it is in Summer. Other causes operate, therefore, in producing the variations of temperature on which the aspects of the seasons depend; and the principal of these is the position of the earth with reference to the direction of the sun's rays, and as a consequence of that position, the alternate increase and decrease of the period of day-light.

It cannot escape the notice of the most superficial observer, that, from the 21st of December until the 21st of June, the arc in the heavens described by the sun gradually enlarges; that luminary rising earlier and setting later in proportion as the space it occupies above the horizon increases. Arrived at its extreme northern boundary, the sun, from day to day, rises more towards the south, and on the 21st of December its return to the north recommences.

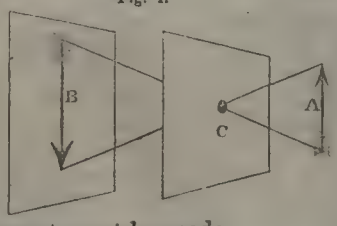
A fact we must not omit here to mention, will be required for the illustration of succeeding parts of our subject. We allude to the periods of the highest and lowest temperatures; which do not occur just when the sun has reached its respective southern and northern limits; but in both cases about four or five weeks afterwards. Thus, the warmest weather generally happens in July or August, and the coldest in January or February.

It will be understood that in speaking as we have done of the sun, we have been describing appearances only. The earth is the body actually in motion, whilst the sun is stationary; and the apparent advance and retirement of the sun through a certain portion of the heavens is occasioned by the earth's motion in the contrary direction.

THE CAMERA OBSCURA.

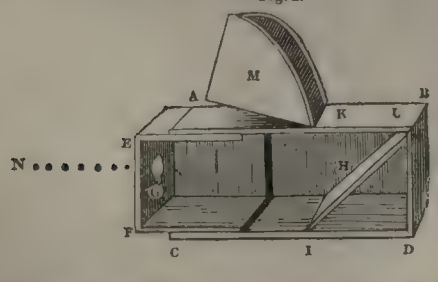
THE Camera Obscura, or *dark chamber*, is an optical instrument, for the purpose of making drawings of objects, which was invented rather earlier than the telescope. If a room be made entirely dark, and a convex lens of two or three feet focus be placed in a hole in the shutter, a beautiful image of all the objects before will be formed in the room behind it, and this image may be received on a sheet of white paper held behind it, but the image will necessarily be reversed. Suppose A, Fig. 1, to be the object, C the shutter, with the lens in the centre, and B the image received on a white screen. If it is required to trace the outline of this picture a different arrangement must be made.

Fig. 1.



The most usual form in which the Camera Obscura is made on a small scale is the following: A, B, C, D, is a

Fig. 2.

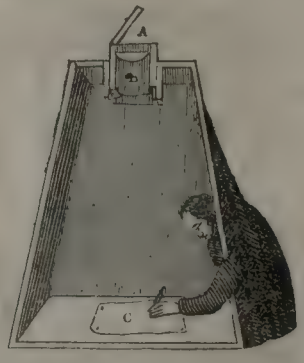


small oblong mahogany box, with the side removed to show the internal arrangement; a smaller box, E F, slides easily in and out at one end. In the end of this box, at G, a convex lens is placed, whose focus is rather greater than the length of the larger box. H is a looking-glass placed at an angle of forty-five degrees with respect to the bottom of the box: that is, if a perpendicular line were drawn from I to K, D, B, K, I, would form a square: on the top of the box at L, a square piece of ground glass is placed. The cover M, which works on a hinge, is intended to exclude as much light as possible from the surface of the ground-glass; and when the instrument is in use it is brought down halfway to B.

The rays of light from an object placed at N, pass through the lens G, and reaching the looking-glass H are reflected upwards on the ground-glass L, and an image of the object is seen on its upper surface. This image may be traced with a black-lead pencil, but it is almost impossible to transfer it from the glass. To obviate this inconvenience, Sir D. Brewster recommends the employment of a partially opaque varnish to the surface of a piece of smooth glass. This varnish can be marked with the finest lines of a pencil, and an impression of the sketch conveyed to paper, by slightly pressing it on the drawing with the hand: one of the simplest and the best of the varnishes he used was that of skimmed milk, perfectly freed of all remains of cream.

Another form is the following:—the frame-work of this Camera Obscura is made of thin mahogany,

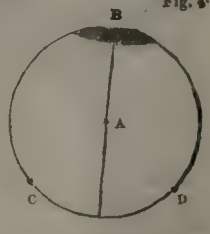
Fig. 3.



and so contrived as to fold up; the inside of this, and of all these instruments, must be painted black. A is the mirror, B the lens, C a white surface on which the image is received; the draughtsman passes his head through an opening on one side, and his hand with the pencil through another, a green curtain surrounding him to exclude the light.

When a Camera Obscura is intended to allow several persons to see the picture at the same time, it is made on a large scale, and great care is taken in preparing the table on which the picture is to be received. The outer portion of the image transmitted by the lens when thrown upon a flat surface, is always distorted, especially when the table is large. To remedy this in some degree, the table is hollowed out like a saucer, the curve being decided by that of the lens itself: thus, A being the centre of the circle which forms the outline of the lens, B will form also the centre of the intended curve of the table; according to this rule, therefore, the curve C D would represent a section of a table adapted to receive the picture through a lens of the same curvature as B.

Fig. 4.



There is a very excellent table of this description in the Camera Obscura in the Observatory at Clifton, near Bristol.

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VIEW ON THE TIBER NEAR THE CASTLE OF ST. ANGELO.

THE BATHS OF TITUS.

"THIS name," says Dr. Burton, "by no means answers to the immensity of the building which once covered great part of the Esquiline Hill, and should more properly be styled the Palace of Titus. This is, in fact, the name which Pliny gives to it." The present ruins extend from the base of the Esquiline Hill near the Coliseum, to one of its summits at the Church of *SS. Martino e Silvestro*, and to another at *S. Pietro in Vincoli*. The site is, to a great extent, occupied by gardens, in various parts of which are to be seen fragments, all once belonging to the same great edifice. The house of Mecænas had previously stood on the same spot, to which, indeed, the Golden House of Nero had extended from the Palatine Hill. Titus employed the materials of both of these edifices, and even of some entire parts, in constructing his baths; this fact is abundantly shown by certain irregularities which the present ruins display. A number of apartments belonging to the baths, were discovered in the sixteenth century; they had lain hidden for centuries under a mass of ruins. It is said that Raffael studied their fresco ornaments, and imitated them in painting the ceiling of the Vatican; and he is accused of having had the rooms filled up again that his thefts might not be discovered. It is certain that they were open in his time, and that they were subsequently filled up; and appearances seem to justify the supposition that they were filled up purposely, and not by the gradual accumulation of soil. But there are other modes of accounting for the filling up, without charging it upon Raffael; the owners of the land, may have wished to clear it for the purposes of cultivation, and these subterranean chambers

would afford most convenient receptacles for the superincumbent rubbish. According to one account, they were filled up to prevent their becoming the hiding-places of banditti. If the fact be true, it furnishes an impressive comment upon the state of the modern, as well as of the ancient city, at that period. In the year 1777 a new excavation was made; but the chief merit of clearing away the rubbish which concealed the chambers is due to the French, who carried on the work with great spirit during their occupation of Rome. The building seems to have originally consisted of two stories: of the upper one but little remains; of the lower there are more than thirty rooms perfectly accessible.

"We passed," says the author of *Rome in the Nineteenth Century*, describing a visit to the Baths,—"the mouths of nine long corridors, converging together like the *radii* of the segment of a circle, divided from each other by dead walls, covered at the top and closed at the end. They must always have been dark. They are *supposed* to have been entrances to the baths, and they are *supposed* to have served for substructions to the theatre above, which is *supposed* to have formed a part of the upper story, of which not a trace remains; and the whole of these suppositions have their source in the inflammable imaginations of Roman antiquaries. Nothing is certain about them, excepting that they are not worth looking at. In one of them are piled up pieces of broken *amphoræ*, marbles of various kinds, and other heterogeneous fragments found in the excavations by the French, among which are some pots of colours. They were analyzed, but nothing new discovered.

"Having passed these corridors, we entered the portal of what is called the House of Mecœnas. It is known that the house and gardens of Mecœnas stood in this part of the Esquiline Hill, which, before it was given him by Augustus, was the charnel-ground of the common people. The conflagration in Nero's reign did not reach to them; and it is believed, that a part of them was taken by Nero into his buildings, and by Titus into his baths. Antiquaries think they can trace a difference in the brick-work and style of building, between what they consider as the erection of Augustus's and that of Titus's age; and on these grounds, the parts they point out as vestiges of the House of Mecœnas are, the entrance, which leads into a range of square and roofless chambers, (called, on supposition, the Public Baths,) and the wall on the right in passing through them, which is partially formed of reticulated building in patches. From these real or imaginary classic remains, we entered a damp and dark corridor, the ceiling of which is still adorned with some of the most beautiful specimens that now remain of the paintings of antiquity. Their colouring is fast fading away, and their very outline, I should fear, must be obliterated at no very distant period; so extreme is the humidity of the place, and so incessantly does the water-drop fall*. By the light of a few trembling tapers elevated on the top of a long bending cane, we saw at least twenty feet above our heads, paintings in arabesque, executed with a grace, a freedom, a correctness of design, and a masterly command of pencil, that awakened our highest admiration, in spite of all the disadvantages under which they were viewed. . . . . Leaving the painted corridor, which is adorned with these beautiful specimens of ancient art, we entered halls, which, like it, must always have been dark, but are still magnificent. The bright colouring of the crimson stucco, the alcove still adorned with gilding, and the ceilings beautifully painted with fantastic designs, still remain in many parts of them; but how chill, how damp, how desolate are now these gloomy halls of imperial luxury! No sound is to be heard through them, but that of the slow water-drop. In one of these splendid dungeons, we saw the remains of a bath supposed to have been for the private use of the emperor. In another we were shown the crimson-painted alcove where the Laocoon was found in the reign of Leo the Tenth. The French, who cleared out a great many of these chambers, found nothing but the Pluto and Cerberus, now in the Capitol, a work of very indifferent sculpture."

The height of the rooms in the Baths of Titus is very great, or as Dr. Burton expressed it, prodigious; and they are comparatively very narrow. Mr. Williams assigns them a height of thirty feet, which must, of course, make them appear still narrower than they are. Many of them are without any trace of windows, as is the case with the most perfect remains of chambers in the Baths of Caracalla. As the ancients were acquainted with the use of glass even for windows, it is presumed that the object of omitting windows here was to render the rooms as cool as possible by excluding the external air.

"In such rooms as these," says Dr. Burton, "in the Baths of Titus, lamps must always have been used; and it may be observed, that there is scarcely a passage in an ancient author, where mention is made of a banquet, but 'the golden lamps,' hanging from 'the roofs,' are always added. According to the hours which the ancients observed for their meals, (the *cœna*, or last meal, being at about three o'clock,) there would have been no need of lights had there been windows to the rooms; which affords another proof that they were frequently constructed without them. Indeed, Grecian architecture seems to derive a peculiar character from the absence of such apertures; if any objection is to be made to the chaste and simple models which ancient Greece has left us, it is that there is a heaviness and a want of relief in the vast masses of solid masonry. The modern Italian architects have gone into the contrary extreme; their aim seems to have been to break every portion of the building into as many parts as possible; and in the pediments of their windows they have been particularly profuse of ornament. The difference is probably to be traced to the fact of the ancients having had few windows in their buildings, and the moderns having many. In such structures as the Palace of Titus, where many ornaments, both in painting and sculpture, were assembled, it might be thought that much of the effect would be lost by their being never seen except by the light of lamps. With respect to sculpture, however, it is well known that there is no greater test of the excellence of the work, than to view it by torch-light; the rising of the muscles, and all those delicate touches of the chisel, which are scarcely observed on the smooth surface of the white marble, are thrown into a much stronger light and shade in this manner. It is not uncommon for parties to visit the Vatican at night, and view the statues by torch-light. The effect is certainly very good; and some pretend to discover that the modern productions appear greatly inferior to the ancient on such occasions. We know that there were formerly some of the finest specimens of sculpture in the Baths of Titus, and the paintings on the walls still remain."

These paintings on the walls consist chiefly of what we now call arabesques; the figures are all very small, and arranged in patterns and borders. They consist of birds, beasts, &c., among which some green parrots may be seen very distinctly; the ground is generally a rich dark red. At the end of one of the rooms is a large painting of some building, in which the perspective is said to be correctly given; this seems to disprove the charge which has been brought against the ancient painters of not understanding the rules of perspective. None of these paintings can, however, be justly regarded as specimens of ancient art; they were intended solely as decorations to the apartments, and were doubtless the work of ordinary house-painters. To judge of the proficiency of the ancient painters from such remains as these, would be as unfair, to use Dr. Burton's remark, as to estimate the state of the arts in England from the sign-posts. Where the walls of the rooms are bare, the brickwork has a most singular appearance of freshness; the stucco also is very perfect in many parts; but the marble, of which there are evident traces on the walls and floors, is gone.

THE SEVEN HALLS OF VESPASIAN.

In one of the gardens forming a portion of the large tract of ground over which the ruins of the Baths of Titus are spread, is a building supposed to have been connected with these baths, and commonly called the *Sette Sale di Vespasiano*,—"the Seven Halls of Vespasian,"—though for what reason it would be difficult even to conjecture. The name was given to it when only seven halls had been opened; there are nine now, and as they form an upper story, it is supposed that there are nine others below them in the lower story which is buried. These halls communicate with each other by means of arches in the partition walls; and the arches are not placed opposite to one another so as to afford a straight view through the whole building in the direction of its length, but are so arranged

* Dr. Burton's account is, on this head, very different. He says that, "Notwithstanding the depth of soil which has accumulated on the top of the building, and which serves for gardens, there are paintings on the ceiling which may be called extremely perfect. The damp seems to have had little or no effect upon them, which is probably owing to the excellence of the Roman brickwork."

as to afford a diagonal view through it. The general figure of the building is that of an oblong, which has a curve in the place of one of the longer sides. The partition walls run from this curve across the breadth of the figure. The longest of them has a length of 137 feet; the width of all is the same—17½ feet.

There is no doubt that this building was an immense reservoir. The walls are coated with a very hard plaster, on which are seen three distinct deposits, one above the other, formed by a sediment from the water. These deposits are now so extremely hard that it is difficult to separate a small portion from the wall. Dr. Burton accounts for the three distinct coatings in a very ingenious manner.

"Of the five great aqueducts which brought water into Rome, the Aqua Julia supplied the Esquiline and Palatine Hills. Consequently the Baths of Titus were fed from this stream, and the *Sette Sale* may have formed the reservoir. Now it is known that the Aqua Julia was a union of three streams: the *Aqua Martia* brought to Rome, U. C. (in the year of the city,) 608 or 640, by Q. Martius Rex; the *Aqua Tepula*, which was brought U. C. 627; and the *Aqua Julia*, properly so called, which was introduced U. C. 721, by M. Agrippa. Each stream originally entered the city by itself; but, as the others were brought, they were successively turned into the same aqueduct, and came on one course of arches into Rome. Now it seems not improbable, that the Aqua Martia or Tepula, (whichever was the earliest,) formed the first deposit. It would seem also by another stream being brought in, that the first must have proved deficient; or while the second work was going on, the water might have been withdrawn, and thus we have the first deposit. Then, when the two streams were let in, another deposit began to be formed, which would not incorporate with the first, but lie over it. Lastly, when the Aqua Julia was being introduced, (after an interval of nearly a century,) the same temporary withdrawing of the water might have taken place, and thus the second deposit would have hardened. After this, the third was formed by the three streams united. To allow this, we must assume that the *Sette Sale* were not built as a reservoir for the Baths of Titus, but long antecedent, which is not at all contrary to the appearance of the building. It is, indeed, natural to suppose, that when Agrippa brought the aqueduct to the Esquiline Hill, there was a reservoir constructed for it. It seems to have been the custom with most of the aqueducts. The remains of a reservoir for the Claudian Aqueduct, are still to be seen, near the temple of Minerva Medica; and what is called the *Castello dell' Acqua Giulia*, is always allowed to have been a reservoir, though it is disputed for what water. The *Piscina Mirabile*, near Baiæ, and the Labyrinth near Pozzuoli, are also instances of this custom prevailing."

Our engraving in page 80 exhibits a view in the "Seven Halls."

AQUEDUCTS.

"I DO not know anything more striking," says Simond, "than these endless arches of Roman aqueducts, pursuing with great strides their irregular course over the desert;—they suggest the idea of immensity, of durability, of simplicity, of boundless power, reckless of cost and labour, all for a useful purpose and regardless of beauty. A river in mid-air, which had been flowing on ceaselessly for fifteen, for eighteen hundred, or two thousand years, poured its cataracts into the streets and public squares of Rome when she was mistress, and also when she was the slave of nations; and quenched the thirst of Attila and of Genseric as it had before quenched that of Brutus and Cæsar, and as it has since quenched that of beggars and of popes. During those ages of desolation and darkness, when Rome had almost ceased to be a city, this artificial river ran to waste among the ruins, but now fills again the numerous and magnificent fountains of the modern city. Only three out of eleven of these ancient aqueducts remain entire, and in a state to conduct water;—what then must have been the profusion of the supply in ancient Rome!"

The term aqueduct, or more correctly aquæduct, composed of two Latin words, signifies in its literal and more extended sense, a duct, or conduit of water; and in this sense the pipes which carry the water under our streets are aqueducts. But the application of the word has been restricted by usage to a peculiar kind of conduits,—those raised partly, if not entirely, above the surface of the ground, for the purpose of conveying water in a slightly descending stream over valleys and plains, from one comparatively high point to another. These aqueducts were very extensively used by the Romans, not only at Rome itself but at many of their great cities in the three divisions of the globe with which they were acquainted. "The boldness of the enterprise, the solidity of the execution, and the uses t which they were subservient, rank the aqueducts among the noblest monuments of Roman genius and power. The aqueducts of the capital claim a just pre-eminence; but curious traveller, who, without the light of history, should examine those of Spoleto, of Metz, or of Segovia, would very naturally conclude, that those provincial towns had formerly been the residence of some potent monarch. The solitudes of Asia and Africa were once covered with flourishing cities, whose populousness, and even whose existence, was derived from such artificial supplias of a perennial stream of fresh water."

Both within and without the walls of Rome, fragments of aqueducts may still be seen. The first was constructed in the year 441 of Rome, when Appius Claudius the Censor brought a stream from a distance of seven miles, which was called from him, *Aqua Appia*. We have a detailed account of the state of the aqueducts of Rome in the reign of Nerva, written by Frontinus his engineer. He tells us that nine different "waters" came into Rome then. A writer of the age of Diocletian makes the number nineteen, and another of the sixth century reduces it to fourteen. The Gothic chieftain Vitiges broke down parts of them without the walls, in order to deprive the city of water when he besieged it. Of the fragments yet remaining, "some," says Mr. Woods, "are of stone, others of brickwork, but the former cannot be traced for any continuance; and while two or three are sometimes supported on one range of arches, in other places almost every one seems to have a range to itself. It is curious to trace these repairs, executed perhaps fifteen centuries ago; the execution of the brickwork, in most instances, or, perhaps, in all, shows them to be decidedly prior to the age of Constantine, and the principal restorations, in all probability, took place when the upper water-courses were added. They generally consist of brick arches, built within the ancient stone ones, sometimes resting on the old piers, but more often carried down to the ground, and in some cases the whole arch has been filled up, or only a mere doorway left at the bottom. Sometimes this internal work has been wholly or partially destroyed; and sometimes the original stone-work has disappeared as the owner of the ground happened to want bricks or squared stones. In one place the ancient piers have been entirely buried in the more recent brick-work; but the brick-work has been broken, and the original stone-work taken away, presenting a very singular, and at first sight, wholly unaccountable, appearance; in other parts, the whole has fallen apparently without having had these brick additions, for a range of parallel mounds mark the situation of the prostrate piers."

Three of the aqueducts of ancient Rome have been repaired and restored so as to afford the modern city an abundant supply of water. These are, first, the *Aqua Virgo*, which was formed by Agrippa, (the minister of Augustus,) and which entered Rome on the north, at the *Porta Pinciana*, after a course of twelve miles, subterraneous for about eleven, and on arches above ground for the remaining one mile; second, the *Aqua Alsietina*, called also *Sabatina*, *Augusta*, and *Trajana*, which was brought by Augustus from the Lake Sabatinus (now Bracciano) on the west of Rome, and which entered the city at the *Porta Janiculensis*, (now Porta S. Pancrazio) after a course, nearly all subterraneous, of twenty-two miles; and third, the *Aqua Claudia*, which was begun by Caligula and finished by Claudius, being brought from the mountains near Subiaco, on the south-east of Rome, and entering the city at the *Porta Prenestina*, (now *P. Maggiore*,) after a course of forty-six miles, for more than ten of which it was raised upon arches*.

The Aqua Virgo was restored by Pope Nicholas the Fifth; it now supplies the Fountain of Trevi, and is called *Acqua Vergine*. The Aqua Alsietina was restored by

* For the last 6½ miles of its course the arches of this aqueduct were continuous, and supported the channel of the *Anio Novus*, besides that of the Aqua Claudia, both of which streams come from the country near Subiaco. The Anio Novus had a course of more than sixty miles; for the first twelve miles it was carried on arches; it then went under ground, and emerging, when it came within six miles and a half of Rome, was carried to the city on the same range of arches as supported the Aqua Claudia, but in a channel above that. At the Porta Maggiore the two channels of this aqueduct may be observed.

Paul the Fifth in 1610, and is now called *Acqua Paola;* it supplies the fountains of St. Peter's. The Aqua Claudia was partially restored in 1587 by Sixtus the Fifth, from whose conventual name of *Fra Felice* (or Brother Felix) it is now called the *Acqua Felice;* it supplies the fountain of Termini.

Of the oldest aqueduct of ancient Rome, the Aqua Appia, only a small portion close to the city was raised upon arches; and of these arches no remains exist. The Aqua Martia (which we have already mentioned in describing the "Seven Halls of Vespasian,") had a course of sixty miles, for the last seven of which it was raised upon arches; and of these arches considerable remains exist. Near the gate of S. Lorenzo may be seen a fragment of this aqueduct with its three water-courses; and at some distance from the walls, the line of arches may be traced for nearly two miles. "Some," says Forsyth, "have proposed the restitution of this aqueduct: 'but Rome,' say the Romans, 'has more water than it wants.'—'Give it then to the Campagna.'—'The Campagna has no inhabitants to drink water.'—'And why has it no inhabitants? but for want of good water as well as good air.'"

Again, he asks, "Why do these aqueducts cross the Campagna in courses so unnecessarily uneven, long, and indirect? Several motives have been alleged, all of which may have influenced the ancients; but their chief motive, in my opinion, was to distribute part of their water to the Campagna itself, and to diffuse it there like the veins in a vine-leaf. Besides this general circuit, the Romans bent their aqueducts, into frequent angles like a screen; not so much to break the force of their currents as to give stability to the arcades."

The constant use of aqueducts by the Romans has been cited as a proof that they were ignorant of the principle in hydrostatics, that water will always rise to the level of its source; and their patient industry has been ridiculed, in taking so much trouble to convey upon arches of brick or stone, what might have been brought in pipes underground. "How far," says Dr. Burton, "or how long, the Romans were really ignorant of this principle, I cannot pretend to say; perhaps, when they first erected arches for this purpose, they were not aware that the labour might have been saved; but it is difficult to deny that many Roman aqueducts were constructed in this manner after the principle was known. The Meta Sudans, a fragment of which still exists near the Coliseum, is said to have been a fountain; and it is evident that the water which supplied it was not raised by mere mechanical means. Pliny mentions one hundred and five fountains (salientes) in Rome; and, from the Latin term for a fountain, it appears certain that they resembled those of modern times, and that the water was thrown up merely by its own pressure. But another passage of Pliny is more decisive, and ought to set the question at rest as to the science of his days; he says, 'The water, which is wanted to rise to any height, should come out of lead. It rises to the height of its source.' In another place he observes, 'the ancients carried their streams in a lower course, either because they were not yet acquainted with the exact principle of keeping a level, or because they purposely sunk them underground, that they might not easily be interrupted by the enemy.'"

Although it is thus evident that the hydrostatical principle was not wholly unknown to the Romans, still it is doubted whether they so far understood it as to believe aqueducts unnecessary, and, consequently, whether they constructed their aqueducts rather from reasons of policy than from ignorance.

The aqueducts of ancient Rome discharged their streams into reservoirs, called *castella*, from which the water was distributed throughout the different districts of the city in leaden pipes. The remains of some of these *castella*, or at least ruins which the antiquaries take to be such, are still to be seen.

THE FORUM OF TRAJAN.

The Forum of Trajan is often spoken of as having been the most wonderful of all the wonders of Ancient Rome. It was the work of the celebrated architect Apollodorous, of whom Mr. Woods says, that "every morsel which we see of his works, makes us regret that we do not see more of them." It occupied the space between the Capitoline and Quirinal Hills; and within its circuit were a palace, a gymnasium, a library, triumphal arch, porticoes, &c., many of which were ornamented with equestrian statues and military ensigns gilt—some of them spoils of the Dacian wars. Its principal ornament was the magnificent pillar or column which still remains erect and nearly perfect; but another very famous one was an equestrian statue of Trajan in gilt bronze. Its whole length is supposed to have been about 1150 feet, and its general width 470 feet. Along the sides were rows of columns; at one extremity stood the temple of Trajan, and on the opposite one, a triumphal arch. About the centre stood the large and splendid "Ulpian Basilica." The whole of its area—even that part exposed to the open air—was paved with marble.

This Forum served, amongst other purposes, to use the language of Sir J. Hobhouse, to perpetuate the memory of the good and great—or of such as in the declining ages could pretend to that distinction. We know that Marcus Aurelius erected statues in this Forum to all those who fell in the German war, and that Alexander Severus transferred thither those of other celebrated personages from other sites. "The same place was devoted to the labours of artists and literary heroes; here the poets and others recited their compositions, perhaps in the Ulpian library; and here their images were allowed a place amongst conquerors and monarchs. The sight of this Forum would furnish a singular supplement to ancient history, and rescue from oblivion many who were as much the delight and admiration of their contemporaries, as Cicero and Virgil."

Ammianus Marcellinus tells us, that when the Emperor Constans entered Rome, A.D. 356, "and came to the Forum of Trajan, a structure which I conceive to be unique in the world, and deserving the admiration even of celestial beings, he was struck with astonishment, casting his thoughts over its gigantic edifices which it is impossible to describe, or for any mortals to imitate. Giving up, therefore, all hopes of attempting anything similar, he said that the only thing which he would or could imitate, was the horse on which the emperor sat. Upon which Hormisdas, of the royal family of Persia, who was near him, said, 'First order a stable to be built similar to this if you have the means: may the horse which you purpose forming, be as successful as that which we are looking at.'" At what period the destruction of this beautiful Forum took place, we are not informed; this, however, we learn, that it was not occasioned by either Alaric or Genseric; for Cassiodorus, who wrote about the year 500, says, when speaking of the most remarkable objects to be seen in the city, that "The Forum of Trajan is a perfect miracle, if we inspect it even with the utmost minuteness." Pausanias mentions among its richest ornaments two statues, one of Nicomedes, king of Bithynia, in ivory, and another of Augustus, executed in natural *electrum*, a substance apparently of a metallic nature, found, although rarely, on the banks of the Po.

At an early period, however, in the destruction of Rome, the Forum of Trajan—the noblest structure as it is called in the ancient city—had partaken of the general desolation; and "we may fairly pronounce that long previously to the twelfth century, the base of the Quirinal had begun to assume its ancient form, ere it had been cleared by the subjects of Trajan." In 1480, this Forum was completely choked up by 200 houses, three towers, and three churches.

Paul the Third opened the base of the column, and in the time of Flaminius Vacca, an arch was dug from under ground, perhaps in the pontificate of the same pope, and the flooring of the Forum was discovered, but immediately shut up again. "The late excavation enables us at last to tread the floor of ancient Rome. The replacing the fragments of the columns on their bases, and the judicious arrangement of the other marbles, has created an effect little inferior to the wonders of Pompeii. The stranger must be much struck with the massive *Greek* dimensions of the fragments when compared with the space in which so many buildings were raised. Here we have a Forum with its porticoes, and statues, and tribunals; a basilica with a double internal portico on every side; a quadrangular court or atrium also adorned with enormous columns; two libraries, a triumphal arch, the great column, and the portion of a temple, crowded into a space not so considerable as one of our smallest London squares."

The site of the Forum of Trajan is fortunately identified by the magnificent pillar still erect; and recent excavations have led to some interesting discoveries. "Marble pavement in its original situation, steps, foundations of walls, numerous fragments of granite columns, and four of the Corinthian bases belonging to them, remain in their places; and these, with the help of several pieces of travertine also unmoved, and evidently intended to receive similar bases, have enabled the directors to put the fragments in proper

situations. What is principally laid open is the Basilica; and for this, it was necessary to destroy several houses and two convents. The width of the part now exposed, is believed to be about half the length of the Basilica. Of the libraries, antiquaries have thought that they distinguished some vestiges near the column; but very little of the situation has been examined, and nothing of that of the Temple of Trajan, erected afterwards by Hadrian. The remains of some piers were found on the north side of the column, and indications of their having been altered and partly removed, in order, as is imagined, to make room for the access to this temple. Two churches and a palace are in the way of any further researches in the direction in which, if anywhere, the remains of the Temple of Trajan would probably be found; and independently of this, the great extent of the ground required to be excavated in order to display the whole design, and the difficulty and expense of preserving it after it is exposed, deprives one of all hope of seeing it executed. The column still remains a noble monument of the taste and skill of the architect Apollodorus."

THE PILLAR OR COLUMN OF TRAJAN.

Trajan's Pillar is the only structure in his Forum which has survived the accidents of time and fortune. It was erected in the year of our Lord 115, by the senate and people of Rome, to commemorate the victories of Trajan in his two Dacian campaigns. The first of these was undertaken in the year 101, and lasted three years; its result was honourable to the Roman arms, as the fierce Dacians were compelled to sue for peace. The second was undertaken in 105, and concluded in the next year; in this, the Dacian king having destroyed himself to avoid capture or defeat, his dominions were subdued by Trajan and annexed to the empire. The column was erected during Trajan's absence in an expedition against the Parthians and Armenians; and although it may have been begun before his departure, it is certain that he never saw it finished, as he died at Seleucia in 117, without returning to Rome. His ashes were brought home and placed in a golden ball at the top of the pillar, "which was a singular honour," says Dr. Burton, "on account of the custom which prohibited any burials within the walls." Some accounts place this golden ball in the hand of the statue at the top of the pillar, and others deposit it at the bottom; the testimony of a coin is in favour of the former. The ball itself is said to be still preserved, and to be that which is seen on the milestone upon the balustrade of the modern Capitol.

The height of this pillar, including the statue which formerly surmounted it, is reckoned by ancient writers at one hundred and forty feet. As it at present stands without the statue, its height is one hundred and twenty-eight modern Roman, or one hundred and twenty-four English feet. When this colossal statue was thrown down is not known. The feet were standing in the time of Pope Sixtus the Fifth, and the head was found in the rubbish at the base. The statue of St. Peter now on the summit is eleven feet high, and of gilt bronze; it was put up by Sixtus the Fifth in 1587.

The whole pillar is formed of thirty-three large blocks of marble, of which eight are used in the base, twenty-three in the shaft, one in the capital, and one above it. The diameter of the shaft is eleven feet two inches at the bottom, and ten feet at the top. The base is square, and measures twenty feet on each side; it is covered with trophies, and at each corner is an eagle holding in his talons a wreath of oak, which extends from the one to the other all round. Inside the pillar is a spiral staircase cut out of the marble blocks, and leading to the summit by one hundred and eighty-four steps; the light is admitted by forty-three apertures. On the base is an inscription, which is perfect except in one small portion, where the letters have been defaced by buildings erected against the pillar in the middle ages; and as usual, the antiquaries have eagerly laid hold of the opportunity to kindle a formidable disputation concerning the missing letters. The doubtful part of the inscription is certainly an important one, for it is that which states the object of erecting the column; but all the various readings proposed lead to the same interpretation in the end. The tenour of the inscription is this,—that the senate and people of Rome erected the column to Trajan, &c., "for the purpose of declaring of how much of its height the mount and the place had been deprived by such great labours."

Considerable discussion has arisen concerning the meaning of this declaration, or rather the inference to be drawn from it. It is supposed by some, that the Capitoline and Quirinal Hills were originally united, or one and the same hill, and that to form his Forum, Trajan cut them asunder, and cleared out a sufficient space between them.

"It has been thought by some," says the Italian geologist Brocchi, "that, before the reign of Trajan, the Quirinal was always connected with the Capitoline Hill; and, in support of this opinion, they adduce the inscription which may be read on the pedestal of the great column, erected between these two hills in honour of that emperor. Those who hold this opinion, consider that the inscription indicates the depth of the cutting made, in order to separate the one hill from the other, as corresponding to the height of the monument itself. We leave it to archæologists to interpret this mutilated inscription at their pleasure, but in whatever manner it may please them to do so, it can never be concluded that the capitol was once connected with the Quirinal. These two hills were entirely distinct from the first ages of Rome, and the fact is so obvious, that long arguments are not needed for its demonstration."

THE PILLAR OR COLUMN OF TRAJAN.

The opinion which Brocchi entertains, and which is now generally entertained, is this,—that Trajan enlarged the valley, which had always existed between the two hills, so as to render the area of his Forum level and more spacious, and that this operation consisted essentially in lessening the steep inclination of the Quirinal, by removing the earth for a distance as high up as corresponded with the capital of the column, thus obtaining a gentle slope which conducted from the mount to his Forum. Dr. Burton remarks, "that, whatever the true reading of the inscription may be, enough remains to prove the extraordinary fact, that as much soil was cut away to form this Forum as equalled the height of the pillar. It does not, however, follow, that the Quirinal Hill ever extended to the site of the column; the work which Trajan undertook may have been in a different part of the Forum."

We have now to describe the most curious and the most

remarkable part of this column, namely, the bas-reliefs which cover the shaft, running round it in a spiral band, which makes twenty-two revolutions in passing from the base to the capital. The subjects of these bas-reliefs are the victories of Trajan in his Dacian campaigns. The whole number of figures sculptured is about 2500; the figure of Trajan himself is repeated more than fifty times. At the lower part of the column the human figures are about two feet in height; as they ascend, and thus become further removed from the eye, their size is increased, till at the top of the column they have nearly double the height that they have below. As a matter of course the height or width of each bend of the spiral increases similarly. These bas-reliefs are executed with great delicacy and spirit, but they possess for us a high value of a different kind.

"The Roman dress and manners," says Dr. Burton, "may receive considerable light from these bas-reliefs. We find the soldiers constantly carrying their swords on the right side. On a march they are generally bare-headed; some have no helmets at all; others wear them suspended to their right shoulder; each of them carry a stick over the left shoulder, which seems to have been for the purpose of conveying their provisions. We may observe a wallet, a vessel for wine, a machine for dressing meat, &c. We know, from other accounts, that they sometimes carried sixty pounds, and food for seventeen days; they never carried less than enough for three days. Their shields are oblong, with different devices upon them. Their standards are of various kinds, such as a hand within a wreath of laurel, which was considered a sign of concord. Pictures also were used, which were portraits of gods or heroes. The soldiers wear upon their legs a kind of tight pantaloon, reaching a little below the knee, and not buttoned. The Dacians have loose pantaloons, reaching to the ancle, and shoes; they also carry curved swords. The Sarmatian cavalry, allies of Decebalus, [the Dacian King,] wear plate-armour, covering the men and horses. These were called Cataphracti, or Clibanarii; and the words of Ammianus exactly answer the representation on the column. 'Their armour was a covering of thin circular plates, which were adapted to the movements of the body, and drawn over all their limbs, so that in whatever direction they wished to move, their clothing allowed them free play by the close fitting of its joints.'

"Some Roman soldiers have also plate-armour, but they are archers. The horses have saddles, or rather cloths, which are fastened by cords round the breast and under the tail. The Dacian horses are without this covering; and the Germans, or some other allies, have neither saddles nor bridles to their horses. We might observe several other particulars, such as a bridge of boats over a river, and that the boats everywhere are without a rudder, but are guided by an oar fastened with a thong on one side of the stern. The wall of the camp has battlements, and the heads of the Dacians are stuck upon it. The Dacian women are represented burning the Roman prisoners. We may also see the *testudo*, formed by soldiers putting their shields together in a compact mass over their backs; also, the sacrifice called suovetaurilia. Victory is represented as writing with a pen upon a shield."

"Trajan's column," says Forsyth, "considered as a long historical record, to be read round and round a long convex surface, made perspective impossible. Every perspective has one fixed point of view, but here are ten thousand. The eye, like the relievos of the column, must describe a spiral round them, widening over the whole piazza; hence, to be legible, the figures must be lengthened as they rise. This license is necessary here, but in architecture it may be contested against Vitruvius himself."

Concerning the merits of the column, as a whole, we quote the following remarks from the *Letters of an Architect*.

"It may be said that one column of this sort is very much like another, and that there is very little room for the merit of the architect; but if you were to go two or three times to the column of Antoninus, and return to that of Trajan, you would feel the great superiority of the latter, though it might puzzle you not a little to find out in what that superiority consisted. This magnificent column must always have been conspicuous as it is now, rising above the Basilica and all the buildings of the Forum; but the pedestal could hardly be seen, except from the confined little court in which it stood. This apparent disproportion is one of the secrets of effect in architecture. You show large and lofty edifices from large spaces it is true, but then you should also endeavour sometimes to bring great things into contrast with little spaces. Nothing impresses the idea of size more strongly; and when again you see the edifice from a larger space, perhaps over the tops of smaller buildings, the imagination carries on the idea of size to all its accompaniments."

THE MOLE OF HADRIAN, OR CASTLE OF ST. ANGELO.

> Turn to the Mole which Hadrian reared on high,
> Imperial mimic of old Egypt's piles,
> Colossal copyist of deformity.

The *Moles Hadriani*, or Mole of Hadrian, was erected by the emperor whose name it bore, to serve for his mausoleum; he is thought to have raised it in imitation of Augustus, whose mausoleum stood at a short distance on the opposite, or left bank of the Tiber, and has not yet altogether disappeared, although its confused remains are surrounded and hidden by modern buildings. Like its prototype, the Mole of Hadrian was circular; it consisted of three stories, each considerably smaller in diameter than the one below it, and the whole resting on a square basement. It is supposed that the first and second stories were adorned with columns and statues around their circumference, and that the third was crowned by a cupola, and a statue of Hadrian. Procopius, a writer of the sixth century thus describes it:

"The tomb of the Emperor Hadrian stands without the Porta Aurelia, at about a stone's throw from the walls, and is undoubtedly well worth seeing; for it is built of Parian marble, the square stones (of which the basement is built,) are joined alternately to each other, without the admixture of any cement, and it is divided into four sides, of equal dimensions; each is of such a length, that a stone thrown from one angle would but just reach the other. In height it surpasses the walls of the city. There are also statues on it of men and horses, finished with wonderful skill out of Parian marble. The inhabitants, a long time ago, observing it stand like a tower overlooking the city, carried out two arms from the walls to the tomb, and, by building them into it, so united it, that henceforward it became part of the walls, for it has a very lofty appearance like a tower, and overhangs the gate in that quarter."

Of this magnificent mausoleum, the basement and the first circular story, stripped of all its ornaments, and encumbered with an irregular mass of modern buildings, still remain. The spectator should always bear in mind, that, with these exceptions, he sees nothing in the present structure which dates earlier than the beginning of the fifteenth century; and that even the circular mass itself has, since that period, been much changed by the explosion of the powder-magazine in 1497, and the final reparation which it then underwent. This enormous tower is imposing from its size, the circumference being 576 feet.

During the siege of Rome by the Goths under Vitiges, in 537, the Mole of Hadrian was converted into a temporary fortress, and to this period is to be referred the destruction of the statues which formerly adorned it; the besieged threw them down upon their assailants. When the scheme of dragging the Tiber for antiquities was carried into execution in 1819, great hopes were entertained that some of these statues would be found, but these hopes were disappointed. The sanguine supporters of the scheme seem to have forgotten, as Dr. Burton remarks, that marble statues, probably of colossal size, could not easily be used as weapons of offence, unless they were first broken in pieces. Indeed Procopius says distinctly that they were so:—"having broken the statues," he tells us, "which were of marble, and of great size, they threw down large stones made out of their fragments on the heads of the enemy." Two statues were, however, found in the ditch of the fortress in the early part of the seventeenth century, but whether they belonged to the collection which ornamented the mausoleum is unknown.

It is probable that the mausoleum had been used as a place of defence before the attack of Vitiges, perhaps during Alaric's invasion. It afterwards fell into the hands of Totila, and the garrison which held it after his death, rendered it a very strong fortress, surrounding it with walls, which they connected with those of the city. It was surrendered by the Goths in 553, during Justinian's reign, and during the period of the Exarchate it was held for the Greek emperors. Luitprand, a writer of the tenth century, thus describes its appearance in his time:

"In the entrance to the city of Rome there is a fortifi-

cation of astonishing workmanship and astonishing strength; in front of the gate is a bridge of great consequence over the Tiber, which is the first in going in or out of Rome; nor is there any other way of passing, except over this bridge, but this cannot be done except by leave of those who guard the fortress. The fortress itself is of so great a height, that a church, which is built at the top of it, in honour of the Archangel Michael, chief of the heavenly host, is called the Church of St. Angelo in the Heavens." There is still a figure of an angel upon the top; but a writer of the sixteenth century speaks of it as a thing which had existed, but did not exist in his days.

In the severe contests, of which Rome was continually the theatre, between the popes, the antipopes, the barons, and the people, the Mole of Hadrian figures conspicuously. The first pope who obtained possession of it was John the Twelfth, who filled the papal chair in the middle of the tenth century. Succeeding popes and antipopes at times held it securely, and at times were driven out of it by the turbulent barons and citizens. Its importance, as an engine for overawing a rebellious people, did not escape the discernment of the pontiffs; neither did it escape the observation of the people themselves, who deliberately declared by a public decree, that when they should obtain possession of it, they would uproot it from its very foundations. In 1378 this decree was near being carried into effect; the partisans of Pope Urban the Sixth, having taken it from those of the Antipope Clement, in spite of the garrison which the French cardinals, who opposed Urban's election, had placed there, proceeded as far as they could in the work of destruction, and contrived to disfigure the structure and reduce it to its present shapeless mass. They stripped off the marbles, and destroyed the form of the square basement, and were only stopped from further mischief by the strength and solidity of the building.

The fortress remained dismantled till 1392, when the two Romani said to Pope Boniface the Ninth, "If you wish to maintain the dominion of Rome, fortify the Castle of St. Angelo." He followed their advice, and the event is thus significantly recorded by a great Roman antiquary. "Pope Boniface the Ninth first fortified the Mole of Hadrian, and established the dominion of the Roman Pontiffs." The people foresaw and felt the fatal consequences. They petitioned Innocent the Seventh, the successor of Boniface, to restore to them "their liberty, the capitol, the Milvian Bridge, and the Mole of Hadrian." They even seized, for a moment, the first three; in an attack on the mole they were repulsed by the pontifical troops, and completely routed in the gardens of Nero, in the Vatican. The popes had now no longer to fight for this fortress with the people, for the future they only fought for it with one another.

The castle underwent many alterations and additions at the hands of succeeding pontiffs. Alexander the Sixth constructed the brickwork on the summit, and also the bastion; to him likewise is to be attributed the secret communication with the Vatican. His additions to the works enabled the castle to withstand the siege of the Imperialists under Charles the Fifth, and it was at last surrendered, not taken by assault. Paul the Third and Paul the Fourth also did much towards ornamenting and strengthening it; but the great engineer was Urban the Eighth, who occupied the pontifical throne from 1623 to 1644; he added a mound, a ditch, a bastion, and a hundred pieces of cannon, thereby making it appear, as a Roman antiquary quaintly observes, that "his bees (the arms of his family, the Barberini,) not only gave honey, but had stings for the fight."

The most interesting event in the history of this castle, is the siege of it by the Imperialists in 1527, when they were led by Charles de Bourbon, (commonly called the Constable de Bourbon, as he was Constable of France,) on his celebrated expedition for the plunder of Rome. He arrived before the walls of that city on the 5th of May; and on the following morning at daybreak commenced the assault. He was himself the first to mount the walls, and he was also the first who fell; Benvenuto Cellini, the sculptor, tells us, in his amusing memoirs, that it was he who fired the fatal shot, but there is of course a great uncertainty upon the point. The city was captured and exposed to ravages greater, perhaps, than it had ever suffered in its decline, from the barbarian Goths and Vandals as we style them. Pope Clement the Seventh withdrew to the Castle of St. Angelo, where he sustained a siege in company with thirteen cardinals.

During the siege Benvenuto Cellini directed the artillery of the castle, and according to his own account, made sad havoc among the Imperialists. Indeed, he tells us plainly, that but for him the castle would have been taken when the city fell. After killing the Constable, he and a companion contrived to make their way to the gate of the castle: "When we arrived at the gate above mentioned," he says, "part of the enemy had already entered Rome, and we had them at our heels. The castellan having thought proper to let down the portcullis, there was just room enough made for us four to enter. No sooner had we entered than the Captain Pallone de Medici pressed me into the service because I belonged to the Pope's household, and forced me to leave Alessandro very much against my will. At this very juncture Pope Clement had entered the castle of St. Angelo by the long gallery from St. Peter's, for he did not choose to quit the Vatican sooner, never once dreaming that the enemy would storm the city. As soon as I found myself within the castle walls I went up to some pieces of artillery which a bombardier named Giuliano, a Florentine, had under his direction. This Giuliano standing upon one of the battlements, saw his house pillaged, and his wife and children cruelly used: fearing to shoot any of his friends, he did not venture to fire the guns, but throwing the match upon the ground made a piteous lamentation, tearing his hair, and uttering the most doleful cries. His example was followed by several other gunners, which vexed me to such a degree, that I took one of the matches, and getting some people to assist me who had not the same passions to disturb them, I directed the fire of the artillery and falcons where I saw occasion, and killed a considerable number of the enemy. If I had not taken this step, the party which entered Rome that morning, would have proceeded directly to the castle; and it might possibly have been a very easy matter for them to have stormed it, as they would have met with no obstruction from the artillery. I continued to fire away, which made some cardinals and gentlemen bless me and extol my activity to the skies. Emboldened by this I used my utmost exertions: let it suffice that it was I who preserved the castle that morning, and by whose means the other bombardiers began to resume their duty; and so I continued to act the whole day."

Cellini was then posted by the Pope's desire with five great guns in the highest part of the castle; "I obeyed his orders," he says, "with alacrity, and had better success than if I had been following my own business." Of the marvellous skill with which he performed the duties of this new station, Cellini has left us an accurate account, embellished in his characteristic manner with various anecdotes more amusing, as Mr. Roscoe, (from whose spirited translation of the *Memoirs* we have quoted,) says than credible.

"There passed not a day," he says, "that I did not kill some of the army without the castle. One day, amongst others, the pope happened to walk upon the round rampart, when he saw in the public walks a Spanish colonel, whom he knew by certain tokens; and understanding that he had formerly been in his service, said something concerning him, all the while observing him attentively. I, who was above the battery, and knew nothing of the matter, but saw a man who was employed in getting the ramparts repaired, and who stood with a spear in his hand, dressed in rose colour, began to deliberate how I should lay him flat. I took my swivel, which was almost equal to a demi-culverine, turned it round, and charging it with a good quantity of fine and coarse powder mixed, aimed it at him exactly; though he was at so great a distance that it could not be expected any effort of art should make such pieces carry so far, I fired off the gun, and hit the man in red exactly in the middle. He had arrogantly placed his sword before him in a sort of Spanish bravado, but the ball of my piece hit against his sword, and the man was seen severed in two pieces. The pope, who did not dream of any such thing, was highly delighted and surprised at what he saw, as well because he thought it impossible that such a piece could carry so far, as by reason he could not conceive how the man could be cut into two pieces. Upon this he sent for me, and made an inquiry into the whole affair. I told him the art I had used to fire in that manner; but as for the man being split into two pieces, neither he nor I was able to account for it. So falling upon my knees I entreated his holiness to absolve me from the guilt of homicide, as likewise from other crimes which I had committed in that castle in the service of the church. The pope lifting up his hands, and making the sign of the cross

over me, said that he blessed me, and gave me absolution for all the homicides I had ever committed, or ever should commit, in the service of the apostolical church. Upon quitting him I again went up to the battery, and continuing to keep a constant fire, I scarce once missed all the time; my drawing, my elegant studies, and my taste for music, all vanished before this butchering business; and if I were to give a particular account of all the exploits I performed in this infernal employment, I should astonish all the world; but I pass them by for the sake of brevity."

It was the fortune of Benvenuto Cellini, at a subsequent period, to become a prisoner in the fortress where he had performed these prodigies of gunnery. He contrived upon this occasion to employ his skill in effecting an escape, the particulars of which he has detailed with considerable minuteness in his memoirs. He succeeded in descending from the battlements of the castle undetected and unhurt; but in attempting to scale one of the outer walls, he fell, and became insensible. On recovering his senses, he imagined he had been beheaded, and was in purgatory. Notwithstanding the injury he had received, he contrived to crawl away; and though the pontiff, Paul the Third, had himself, in his youth, made his escape from the same confinement; he caused Cellini to be again committed to the prison, where he suffered incredible hardships, and witnessed still more incredible visions.

The castle of St. Angelo received the appellation which it now bears in the pontificate of Gregory the Great, who, in crossing the bridge of St. Angelo as he went to offer up prayers for the deliverance of the Romans from a pestilence with which they were afflicted, beheld, according to the story, on the summit of the Moles Hadriani, the figure of an angel sheathing a sword. In commemoration of this vision, the brazen statue which still crowns the castle was erected, and the building, as already stated, received the name by which it has since been distinguished. It has been long used as a public prison, and contains about four hundred wretched criminals, who have been sentenced to the galleys. The upper apartments, which present little worthy of notice, are used as prisons for the confinement of state criminals. In the principal saloon is exhibited a bust of Hadrian; and this apartment was used as a theatre for the representation of a tragedy during the fifteenth century. From the summit of the castle a fine view is presented of the windings of the Tiber; except for the purpose of ascending to the summit to enjoy this view, the interior of the castle is scarcely worth a visit.

As a fortress the castle of St. Angelo is now almost worthless. "Since the modern improvements in artillery," says Sir John Hobhouse, "it is clear that a castle, commanded as it is by all the neighbouring hills, could never resist a cannonade. It was surrendered during the late war in 1814, after an idle menace from the French captain that the angel on the top should sheathe his sword before the garrison would capitulate."

On Easter Monday there is a splendid display of fireworks from the castle of St. Angelo. Mr. Galiffe speaks of it in high terms. "If my expectations," he says, "were disappointed in the illumination [of St. Peter's], the fireworks far surpassed everything that I had ever seen or imagined. The signal for their commencement is given by a cannon-shot, a little after ten, which is instantly followed by the simultaneous explosion of three thousand sky-rockets, expanding in their flight in the form of a sheaf of corn. I had seen an explosion of fifteen thousand at once in the gardens of Peterhoff; but they did not produce the twentieth part of the effect of this one-fifth of their number, thus skilfully managed, and shooting upwards from the summit of the grand castle of St. Angelo. A beautiful cross-fire of all sorts of fire-works ensues, and the scene terminates with another flight of three thousand sky-rockets, similar to that with which it commenced. This certainly is the grandest exhibition of the kind that I have ever seen. The windows facing the castle, on the other side of the Tiber, are in great request on these occasions, and let at high prices.

REMAINS OF THE SEVEN HALLS OF VESPASIAN.

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KILLARNEY. No. VI.

DUNLOH CASTLE.

THE SHORES OF THE LOWER LAKE—THE TOWN OF KILLARNEY—THE CASTLE AND GAP OF DUNLOH.

ONE of the chief sources of attraction at Killarney is to be found in the very varied character of the scenery upon the borders of the body of water composing the two lower lakes,—Turk Lake and Lower Lake, as they are respectively called. Its southern and western shores are bounded by the lofty mountains which form so remarkable a feature of the county of Kerry, and which comprise among them the most elevated summits in all Ireland. Very different is the scenery on the other sides. The northern shore is bounded by hills of moderate height sloping gradually down to the water's edge. The part also of the eastern shore, lying contiguous to the northern, is bounded by similar hills; as is likewise that part of it which lies contiguous to the mountains of the southern shore. But throughout the remaining or middle portion of the eastern side, the hills recede considerably, so that for the space of about two miles, a low and level tract intervenes between them and the lake, instead of their coming down close to its waters. This level ground, in itself the least interesting part of the shores of Killarney, becomes of importance to the general effect of the scene, from the striking contrast it offers to the mountains, and the apparent increase it gives to their height.

To the southward this flat commences where the hills adjoining the peninsula of Mucruss terminate—that is to say, at Castle Lough Bay, as that great inlet is called which lies to the north of Mucruss peninsula, and forms the south-eastern corner of the Lower Lake. Near the head of the bay formerly stood the old fortress of Castle Lough on an insulated rock; it was a place of strength at least for its size, but was so completely demolished by the Parliamentary army under Ludlow, (whose capture of Ross Castle we recorded in a former number*,) that not a trace of it can be discovered, except a few fragments of walls scarcely discernible from the rocks on which they stand. The name of Castle Lough is at present given to a private demesne.

As far as the river Flesk, which enters the lake opposite the southern end of Ross Island, the flat forms a part of the demesne of Cahernane, an extensive and well-wooded place, described as interesting and possessing many advantages, notwithstanding

* See *Saturday Magazine*, Vol. XI., p. 195.

the level of the surface. The Flesk is crossed by a bridge over which runs the road to the town of Killarney, bordered by tall lime-trees. From the river Flesk to the road leading from the town to Ross Castle, the flat is occupied by small fields, bare of trees, and mostly divided by stone fences, and on the opposite side beyond the road, are the gardens and pleasure-grounds attached to the mansion of the Earl of Kenmare.

These pleasure-grounds are not, however, wholly on a low level surface. The flat ends at the little stream called the Deanagh, which, running from the north and passing almost close to the town, bends suddenly off and empties its waters into the lake. Beyond, or on the north of this river, the ground is diversified with gentle knolls covered with verdure, and adorned with some fine trees, beneath which there are walks commanding very charming prospects of the lake.

Upon the low flat which we have thus described as stretching inland for some distance from the eastern shore of the Lower Lake, stands the town of Killarney, about a mile from the water. It is comprised within the parish of the same name, in the barony of Magunihy, in the county of Kerry, and in the province of Munster; it lies to the south-west of Dublin, at a distance of 224 miles; its distance from Cork is only 45 miles. It boasts of two broad streets, called respectively the Old street and the New street, besides several smaller ones, more deserving of the appellation of lanes. The public buildings are not worthy of any particular notice. Mr. Wright mentions a public reading-room, to which strangers are politely invited by a singular announcement, to the effect that none but members or strangers are admitted. The mansion of Lord Kenmare, with its park and grounds, of which we have already spoken, adjoins the town, and generally attracts some of the attention of the visiter. The linen manufacture has made considerable progress under the patronage of the noble proprietor of the town, and the inhabitants derive great benefit from the visits of strangers during the Summer and Autumn.

The first object (says Mr. Barrow,) that catches the eye of the stranger on driving into the town, is the prodigious number of idlers lounging at every corner of the streets. The town itself, at least the main street, is pretty enough, but on either side the lanes and alleys have a dirty appearance, and the people strolling about were not at all prepossessing. There was stirring enough, however, as we drove up to the Kenmare Arms Hotel, where the coach stopped; here I found myself instantly surrounded, jolted, and jostled by a set of hungry-looking fellows, who all at once began to assail me with open mouths. One offered himself and his boat, the best in all Killarney,—another his pony to take me to the gap,—a third slily recommended the other two 'to get out of that, for *shure* the gintleman knows what he likes best,' and then confidentially whispering in my ear, —'Shure, your honour, mine's the best pony in the world to carry you to the top of Mangerton.' Escaping from this troublesome group comes a fellow directly in front, with his pockets full of divers-sized packets of Arbutus-seed, which he assures,—'there's niver the gintleman comes to Killarney that doesn't buy some to take home wid him.' Add to all these some dozen or two beggars, male and female, who fill up the outer circle, and the whole time chime in with their pious ejaculations, blessing, and praying, and preserving his honour's long life, and his honour's father and mother, and his wife and children; and these again are interrupted by a heap of ragged errand-boys, offering to go to the post-office for his honour's letters, or, in short, to do anything in the world for sixpence; and, lastly, come the pressing and polite invitations of the waiters of the respective inns, which, however, is not peculiar to Ireland. From this specimen you may form some slight idea of the hearty and welcome reception a stranger meets with on his arrival at Killarney.

The greatest inconvenience, however, chargeable upon Killarney, as Mr. Wright says, is the distance of the town from the lake. It was not possible to have fixed, in all the neighbourhood, upon a worse situation for the site of a village; the backs of the houses are turned towards the lake, the view of which is totally excluded by Lord Kenmare's woods, and but for the supply yielded by a few wells, there would not be any fresh water in the village, although there are rivers at a short distance on every side.

Not far from the town, two small rivers, the Deanagh and the Flesk, fall into the lake. If the town had been built at the mouth of either of these streams, and especially at the mouth of the latter, it would have enjoyed advantages of which it is now deprived, and visiters would have then had little ground of complaint. The inns in the town are generally crowded during the lake season. Mr. Barrow gives an amusing picture of the scene which one of them presented.

I had no sooner (he says) taken my seat in the coffee-room, than I found myself in the very midst of tourists. In one corner sat half-a-dozen noisy and merry looking fellows, clustered together, with an array of maps stretched out before them, talking over the exploits of the day, and making arrangements for the morrow. In another might be seen some solitary tourist (like myself), poring over a well thumbed "Guide to the Lakes," and ever and anon seeking information or explanation from the waiter. Some were busily employed with their knives and forks, in different parts of the room; while others were amusing themselves with reading over the names of the numerous visiters contained in the book that is kept for their insertion, and in which may be found what are intended for flashes of wit. I once peeped into this general consignment of experimental efforts of genius, and having discovered amongst some other equally valuable information, "that the *port* at the Kenmare Arms was," in the opinion of the writer, "finer than any *port* on the lakes," I felt satisfied, and hastily closed the volume.

On account of its low situation, as well as the intervening woods, the town of Killarney commands no prospect of the magnificent lake scenery; indeed, from no part of the flat in which the town stands, can any considerable portion of the lake be seen. But if the spectator advance inland across the flat and ascend the hills which bound it, he soon obtains some very charming views, perpetually varying in the most striking manner. The contrast between the confined glimpses obtained from the low plain and the broad expanding prospects which the rising hills command, will impress him with increasing force the higher he mounts. From that part of the flat which lies adjacent to the river Flesk, the small patches of the lake which he beholds appear like the windings of that stream. On ascending the rising ground, the wooded islands become more distinct; and the lake, instead of appearing like a dilution of the Flesk, rather wears the aspect of "a majestic navigable river, which received its tributary stream while rolling on through a spacious valley." Higher still on the hills, the view opens wider, and the actual form of the lake is fully displayed. From several positions on the hills, particularly from parts of the extensive deer park of Lord Kenmare, the prospect of the flat shore between the spectator and the water is effectually excluded by the trees on the slope beneath him; his eye therefore looking over his own wooded foreground, and lighting in the distance upon the woods of Mucruss on the one side, and those stretching along the western border of the lake to the river Laune on the other, he might imagine that the shores of the lake were covered with a vast forest from end to end.

The river Laune is the only outlet of the Lakes of Killarney, their superfluous waters flowing through its channel into the Atlantic at Dingle Bay. Its

source, or rather commencement, is at the north-western corner of the Lower Lake, whence it runs in a rapid course between the end of the hills on the northern bank, and the end of the vast mountain mass which lies on the western bank. Soon after leaving the lake it is crossed by a bridge; near which stands Dunloh Castle, the remnant of an ancient fortress, which seems to have been originally erected for the purpose of guarding the river, and a defile in the great chain of mountains. It stands on the summit of a small conical hill, whose apex has been cut away to afford a more convenient space for building; and its position must have rendered it, until the introduction of cannon into modern warfare, a place of great strength. It suffered considerably in the wars of the Earl of Desmond, during the reigns of Henry the Eighth and Queen Elizabeth; but it was rebuilt about the period of Sir George Carew's administration in Munster. Subsequently, when the forces of the Parliament came into this part of Ireland, the castle was again attacked, and a great part of it demolished by a bombardment. The only part of the edifice now standing is a square tower, which constituted but a small portion of the original fabric; this has been converted into a dwelling-house, "which affords more room and convenience than could be expected from the exterior aspect." Owing to the extraordinary thickness of the woods covering the hill upon which the building stands, no part of the lake or of the surrounding country is seen from the area in front of the castle, and even the windows afford but a very confined view; the battlements, however, command a noble prospect of the lake, and of the windings of the river Laune. Our engraving represents the castle as it appears from the banks of the river; in the distance appears the defile or opening in the mountains already mentioned.

This defile, which lies between Tomies Mountains and Macgillicuddy's Reeks, is called the Gap of Dunloh. The entrance is formed by the Holly Mountain and the Bull Mountain, which are shoots from the two larger masses above mentioned.

Amidst the vast mountainous region on the western side of the county of Kerry, there is no scene which exhibits a more varied and sublime combination of the boldest features of uncultivated nature than the Gap of Dunloh. By some terrific and mighty operation, the chain of mountains at this place seems to have been abruptly severed, and the stupendous rocks of which it was formed rent asunder and dispersed in wild disorder through the chasm. On the brow of the mountain which guards the entrance on the right hand, immense projecting masses of stone, suspended in their lofty beds, overhang the pass, threatening destruction to all who approach this savage solitude; and the vast fractured stones which are observable at the base of the cliff, plainly indicate that the danger has not always been imaginary.

One almost shudders at thinking of the horrible crash which must have been produced by these ponderous stones

> Tumbling all precipitate down dashed,
> Rattling round loud thundering to the moon,

whilst the echoes in the still of retirement repeated the tremendous sound through the windings of the vale. A clear stream at the bottom of the defile winds amongst the rocks,

> .....now rapid and now slow,
> Now murmuring soft, now roaring in cascades.

This stream forms a communication between a chain of small lakes, some of which are very deep, but others seem only to be a dilatation of the stream, where it has been obstructed in its course by the accumulated ruins of the impending precipice.

The entrance to the gap is very narrow; and the mountains on each side rise perpendicularly. At a short distance within is a little wild romantic glen, containing a small lake, the waters of which, from the shade cast upon them by the enormous mountain which hangs above, assume a peculiarly dark hue. As the visitor penetrates further into the defile, his admiration of the wild and savage scenery which surrounds him gradually gives way to a feeling of awe. At one point the defile becomes so narrow that there is space merely for the scanty road and the little dark gloomy lake beside it; on either side are steep precipitous crags, while in every direction are seen enormous masses which have been detached from the body of the mountains. Such, indeed, is the fearful sublimity of the pass at this particular spot, that instances have been known in which persons became so paralyzed with terror on reaching it, that nothing could induce them to advance further and brave the apprehension which had seized them, that the mountain might fall and overwhelm them. There are two small bridges thrown across the stream which runs through the defile, at the narrowest parts of the channel; they are of very simple though solid structure, and are in good keeping with the character of the scenery. One of them situated at the head of a cascade, and resting at each end on a single stone, has a very romantic appearance. The object of the bridge is to carry the road from one side of the defile to the other, where the obstacles on the former happen to be insurmountable. The road itself has been formed with considerable skill. In some places it passes along the edge of precipices where the way has been with difficulty cut through the solid stone; in others between immense detached rocks which have fallen from the mountain, and which are just sufficiently separated from each other to admit a single carriage, thus affording a natural passage that could not have been opened elsewhere without prodigious labour and expense. At one particular part of the pass the road runs along the margin of a black pool, "and is so unprotected as to inspire the equestrian traveller with fears that should his horse trip he might be precipitated into the lake."

But a scene of this description (says Mr. Wright), defies the address of the most expert tourist and the pencil of the ablest master: it must be seen to be understood. Those who have visited the passes of Borrowdale, in Cumberland, may form a faint idea of the chilling dreary grandeur of Dunloh; but the pass of Llanberris in North Wales, bears a still greater resemblance, and he who has seen the Gap of Dunloh will not be over-awed by the sublimity of Llanberris, nor will the deep-rooted image of Dunloh be eradicated by the combined beauty and grandeur of Borrowdale*.

The defile is three miles in length, and at the termination of it a view of the Upper Lake is to be had. It opens into the vale of Comme Duff, through which the road proceeds. Nearly opposite the termination of the gap is a beautiful waterfall of considerable height, and always plentifully supplied. The waters of this fall flow into a succession of small lakes, occupying the whole length of the valley; in some of these are islands bearing shrubs on their surface and decorated with water-lilies.

* "The scenery," says Sir R. C. Hoare, "is truly Alpine, and on a grand scale: the track rugged, but well worth the trouble of ascending. The horrors of the black surrounding rocks are much heightened by their reflections in the different lakes at their base. The scenery resembles that of the Pass of Llanberris under Snowdon in North Wales, but the vegetation amongst the rocks is much more luxuriant. This valley and pass afford many good subjects for the pencil, and are highly worthy the artist's attention."

It is the virtue of few words, to render plain that which thousands have obscured; as one glass will transmit a bright image of the sun, where hundreds produce but darkness and confusion.—MACCULLOCH.

ILLUSTRATIONS OF THE BIBLE FROM THE MONUMENTS OF ANTIQUITY.

No. IX.

Early History of Moses.

Many readers of the Bible are confused by finding the same name given to very different persons; in the earlier ages of the world proper names were not applied with the same regularity that they are now, titles of rank were frequently used in their place, and more especially the national titles of sovereigns. Pharaoh was the Egyptian designation of a king, and hence we find it given as the name of the monarch who received Abraham, of him to whom Joseph was minister, and of the foreign conqueror who so cruelly persecuted the Israelites. This usage has not quite disappeared; in works of modern history we find the term Sultan, employed to designate the ruler of Turkey, without the addition of his proper name; and the name of the Great Mogul similarly applied to the emperor of Delhi; and some writers omitting to mention changes in the succession have frequently led historical students into serious errors. To avoid such mistakes, we shall designate the Pharaoh who persecuted the Israelites, Pharaoh the Third, not because he stands third in the order of succession, but because he is the third mentioned in Holy Writ.

Pharaoh the Third found that the severe tasks he imposed on the Israelites did not prevent the continued increase of their numbers, "The people multiplied and waxed very mighty." (Exod. i. 20.) The tyrant, therefore, had recourse to the barbarous expedient of extermination, and ordered all the male children to be slain. Several sceptics have sneered at the improbability of such cruelty, though it is far from being without a parallel even in modern history. We have shown that Pharaoh the Third was the sovereign of an intrusive race of conquerors, whose position in relation to the native Egyptians and the Israelites was very similar to that of the Turks with respect to the Greeks and the Armenians. It is not generally known that, though Turkey in Europe contains more than eight millions of inhabitants, the Turks themselves do not amount to half a million, but their position as a dominant caste enables them to rule over fifteen-sixteenths of the population. Turkish sultans have been as much alarmed by the increase of their hostile subjects as Pharaoh the Third, and though they never have completely adopted his plan of extermination, they have sanctioned partial massacres, and more than once prepared to follow the system of destroying the Christian males to its fullest extent. When we read of the massacres perpetrated by the Spartans on the Helots, whenever the increase of their numbers rendered them formidable, we cannot doubt that a dominant caste, such as that which ruled Egypt under Pharaoh the Third, will hesitate at no act of cruelty, however atrocious, to ensure and continue its superiority.

In the midst of this cruel persecution Moses was born, and was concealed three months by his mother; when she could no longer hide him, "she took for him an ark of bulrushes," or as the words may more properly be translated, "a boat made out of the papyrus," and placed him by the brink of the river. The *papyrus**, from which we have derived the word "paper," was anciently named *byblus*, and is the origin of the word "Bible," which properly signifies a paper book. It is called *al bardi* by the modern inhabitants of Egypt, who do not, however, pay any attention to its cultivation. But in the early ages no plant was more important; the soft pith was a common article of food, the stem supplied materials for small boats like canoes, and a variety of domestic utensils, while the inner rind of the plant, or, as some think, a certain preparation of the pulp, furnished materials for paper. It is well known that the byblus plant grows also in Europe, though only in one spot, namely, in the rivulet of Cyane, near the ancient city of Syracuse, in Sicily, but there it is produced in great abundance.

The *byblus*, or papyrus, grows in shallow water, and shoots out a stalk of nine or ten feet high; the trunk is composed of a number of long straight fibres, which produce small flowers; the leaves are like the blades of a sword, and are frequently used to keep wounds open; the ancient Egyptians employed the ashes of the root as a cure for sores, and attributed to it great healing powers. The length of the stalk, the natural hollow when the pulp was removed, and the ease with which it was worked, pointed out the byblus as a proper material for boat-building. Herodotus tells us that large boats were formed from planks cut out of the root, which is frequently fifteen feet in length; that the light stem furnished a mast, and the manufactured papyrus supplied ropes and sails. But the smaller boats, or canoes, were probably formed from the light stem, like the wicker cots which are now used on the Upper Tigris. There are many delineations of the Nile-boats on the monuments; some are evidently of very heavy burden, and are impelled both by ropes and sails: some are so small that they can only contain one person, who appears to be very careful in adjusting his equilibrium, lest he should overset the frail vessel. In the accompanying engraving the fisherman is represented in one of these boats, which seems to be particularly intended for shallow waters where fish might easily be speared.

The papyrus boat in which Moses was exposed, was daubed with slime and pitch, that is, both with mineral and vegetable substances, to stop the chinks and keep out the water. A mineral tar, frequently employed for this purpose, is produced abundantly on the coasts of the Red Sea, and is so remarkable for its antiseptic properties, that it has been successfully applied to the manufacture of mummies. In the Museum of the Royal Asiatic Society of London, there is a human hand preserved by this mineral tar, so very perfect that the shape of the nails can be clearly seen. When the mother of Moses, therefore, had staunched the boat with this or some similar substance, she had reason to hope that it would float in safety, until some charitable person should take compassion upon the child. But in her immediate neighbourhood concealment was necessary, and "she laid it in the flags by the river's brink." From the monuments we find that the water-plants of the Nile, especially the lotus-lily, grew sometimes to such a height that they formed lurking-places for full-grown men. We see large nets for catching birds set in the marshes, watched by trappers who hide themselves in the lotus beds, and remain undiscovered until there is sufficient prey in the net. It is very probable that the sister of Moses availed herself of some such place of concealment, where she could watch the fate of the child without danger of detection.

"The daughter of Pharaoh came down to wash herself at the river;" we can find no examples of baths on the monuments, and it seems probable that ladies bathed as freely in the Nile as they now do in the Ganges.

When the daughter of Pharaoh beheld the weeping child, she had compassion on him and said, "This is

* See *Saturday Magazine*, Vol. IV. p. 208.

EGYPTIAN FISHERMAN IN A BOAT OF THE PAPYRUS.

one of the Hebrews' children." We find from the monuments that the Israelites were marked by the peculiar physiognomy which characterizes the Jews of the present day, so that the instant the princess beheld the child, she was quite certain of its parentage. This is one of the minute traits which at once stamps the authenticity of a narrative, for it is one which at the first glance seems improbable, but being confirmed by undesigned coincidence, becomes the very strongest corroborative evidence.

"She called his name Moses, (which signifies, drawn out); and she said, Because I drew him out of the water." The circumstance of naming persons from some striking peculiarity must be familiar to every reader of the Old Testament.

Though "Moses was instructed in all the wisdom of the Egyptians," we find that he never forgot his parentage. It is probable, that in spite of the exalted patronage he enjoyed, the courtiers of Pharaoh failed not to remind him that he belonged to a degraded caste. This, indeed, is evident from the reproach of the Israelite whom Moses reproved for injuring one of his brethren, "Who made thee a prince and a judge over us?" In this passage, the word translated *prince* more properly signifies *man*. Now, in almost every example of a dominant caste established in a country, we find its members exclusively arrogating to themselves the title of *man*, as if their inferiors were below the ordinary level of humanity. Indeed, our English title *baron*, simply signifies *man*, and was introduced at the time of the Conquest, when the Normans reduced the Saxons to a state nearly as degraded as that of the Israelites during their Egyptian bondage. Nothing more forcibly proves the miserable condition of the Hebrews, than the readiness with which this delinquent adopted the reproachful language of the oppressors, and denied the title of man to the most exalted of his own nation.

The reigning Pharaoh "sought to slay Moses;" an injury to one of a ruling caste is never forgiven. Were Pharaoh inclined to pardon Moses, it is probable that he would have found such an act of clemency beyond the limits of his power; even at this day, the sultan of Turkey would find it a very hazardous experiment to spare a Raya who had struck, much less slain a Turk.

Moses fled into the land of Midian. There are two countries known by this name in Scripture; one eastwards of the Asphaltic Lake, on the confines of Moab, the other which afforded shelter to Moses, on the Elanitic Gulf of the Red Sea. The inhabitants of the latter appear to have been a pastoral as well as a commercial race; they seem to have left the care of their flocks to women, which will account for the circumstance of the introduction of Moses to the daughters of Jethro. It may be added, that in this part of Arabia, the duty of attending the flocks is still regarded as a degrading employment by men, and generally falls on the female part of the population.

During the interval between the birth of Moses and his appearance before the sovereign of Egypt to claim permission for the children of Israel to go and worship God in the desert, the persecution of the Hebrews seems to have relaxed. A new Pharaoh most probably filled the throne, whose attention was not directed to the condition of his subjects in the land of Goshen until this application was made to him by Moses and Aaron. Pharaoh the Fourth revived the cruel policy of his predecessor: "Behold the people of the land now are many, and ye make them rest from their burdens." (Exod. v. 5.) The respite, however, was doomed to be of no long continuance, and the tyrant soon invented a new refinement of oppression. "Ye shall no more give the people straw to make brick as heretofore: let them go and gather straw for themselves." (Exod. v. 7.) Straw is not used in the modern manufacture of bricks, but anciently it was to connect and compact bricks dried in the sun. Bricks thus formed of straw and mud are still made in Egypt, and their ancient use is proved by the numbers found in the ruins of the brick pyramids.

Pharaoh the Fourth having thus deprived the labourers of the materials necessary for the manufacture in which they were engaged, insisted that they should still perform their allotted tasks. "And the tale of the bricks, which they did make heretofore, ye shall lay upon them; ye shall not diminish ought thereof: for they be idle: therefore they cry, saying, Let us go and sacrifice to our God. Let there be more work laid upon the men, that they may labour therein; and let them not regard vain words." (Exod. v. 8, 9.) The unfortunate Israelites were thus forced to undertake a new labour. "So the people were scattered throughout all the land of Egypt, to gather stubble instead of straw." (Exod. v. 12.) Many persons judging from our agricultural habits, might be led to suppose that Pharaoh required impossibilities; but as we have already observed in a former article of this series, the Egyptian reapers only cut off the ears of the corn, leaving the greater part of the stem untouched, so that the straw remained for

waste. Consequently, though the task imposed upon the Israelites was very severe, it was not wholly impossible.

The Israelites were unable to fulfil the double task, "And the officers of the children of Israel, which Pharaoh's task-masters had set over them, were beaten." (Exod. v. 14). This is a trait of government belonging to the oriental nations, both in ancient and modern times, but especially to such as have the misfortune to be ruled by a dominant caste. The Turk in the west of Asia, and the Mantchew Tartar in the remote east, make the stick the chief agent of administration. The highest officers of state are exposed to this infliction, which is never supposed to degrade the sufferer; on the contrary, we find many examples of viziers and nobles bastinadoed by order of their sovereign, for some slight offence or groundless suspicion, subsequently restored to favour and rank, without any one feeling that public punishment had weakened their respectability.

There are some who pretend to believe, that the accounts given by the sacred historian of the tyranny of the Pharaohs must be exaggerated; but the Fellahs of Egypt are, at the present day, subjected to oppressions similar to those described by Moses, and the remembrance of the Israelites is recalled to the mind of modern travellers, by the sufferings and the cruelties with which he is shocked at almost every step in that unhappy country.

ARSENIC.

ARSENIC is but rarely found in a state of purity. It commonly occurs in combination with the ores of cobalt, silver, lead, iron, and nickel. The minerals known by the names of *realgar* and *orpiment*, consist of Arsenic and sulphur in different proportions. The former of these native products seems to have been known to the ancients, and used by them in painting and for medicine.

Metallic Arsenic is exceedingly brittle, of a crystalline structure, and so volatile, that at a temperature of 356 degrees it is vaporised without melting. Its colour is a grayish-white, very much resembling that of polished steel, to which also its lustre bears a close analogy. This metal speedily tarnishes on being exposed to the action of air and moisture, its surface becoming covered with a film of black powder, which is sometimes superficial, whilst at other times it extends throughout the whole mass. It is said that some specimens of metallic Arsenic, which are supposed to have been in a state of extreme purity, have been kept for years in open vessels without losing their characteristic brilliancy.

Arsenic is highly inflammable, burning with a blue flame, and emitting fumes, the odour of which is very much like that of garlic. The Arsenic of commerce, commonly called *white Arsenic*, and by chemists *arsenious acid*, is a compound formed by the union of the metal with oxygen. The greater part of it is obtained from Bohemia and Saxony, where it is prepared by submitting the arsenical ores, with which those countries abound, to a strong heat in an oven, or reverberatory furnace, to which is attached a horizontal flue several hundred feet in length. In this flue the vaporised Arsenic is condensed, in the form of a dark gray powder, which is again heated, but in close iron vessels, when the impurities are separated, and the arsenious acid obtained in dense solid masses possessing a vitreous (glassy) lustre. By exposure to air, however, these semi-transparent masses gradually become opaque and fall into fine white powder, in which state Arsenic is commonly sold at the shops.

In its metallic state Arsenic is used in the arts, but not to any great extent. It forms an alloy with copper which is very malleable, and when plated with silver susceptible of a fine polish. This alloy enters into the composition of the specula of reflecting telescopes. Arsenic is also used in the manufacture of shot; a small quantity being mixed with the melted lead is found to impart to it the property of granulating in spherical drops. Arsenious acid is employed for purifying flint glass, whilst in a state of fusion, and for preparing colours used in painting. But for this latter purpose it is not so well adapted as the sulphurets of Arsenic already mentioned, namely, realgar and orpiment, to which we are indebted also for some very beautiful pigments used in dying and calico-printing.

Arsenic (arsenious acid) is one of the most virulent poisons with which we are acquainted, and as its cheapness renders it accessible to all classes, it has obtained an unfortunate celebrity by its frequent association with deeds of murder and suicide. Until very lately this dangerous substance has always been described as acrid and nauseous to the taste, producing a sharp burning sensation in the mouth and throat. This description is erroneous. Arsenic possesses hardly any taste, and what it has is sweetish, so that it is possible to swallow it without exciting suspicion or alarm. It is but slightly acted on by cold water, requiring four hundred times its own weight of that liquid for its solution. Of boiling water only thirteen times its weight is required; but on being permitted to cool the Arsenic separates from the water in the proportions just mentioned. Its solubility is greatly impaired by admixture with vegetable or animal substances, as coffee, tea, milk, and other similar materials.

Arsenic is very commonly used for destroying vermin, especially mice and rats, a practice which we think cannot be too strongly discountenanced, since it is never resorted too without considerable risk, and has often been attended by consequences the most unexpected and distressing. It is only a few months since that a poor boy lost his life by eating a piece of poisoned bread and butter, which had been incautiously left in an exposed situation as a bait for rats. And we know of numerous instances in which valuable animals have been destroyed whilst the vermin have escaped. Another objection to the use of Arsenic for the purposes just mentioned is, that it facilitates the means of obtaining it; thus placing it within the reach of persons who are too often excited by malice, revenge, or despair, and who, being familiar with its poisonous effects, resort to it as a ready instrument of destruction to themselves or the objects of their hatred. Hence it is that the number of deaths from poisoning by Arsenic, both by accident and design, very greatly exceed those occasioned by any other substance.

For medicinal purposes Arsenic has long been employed, but it requires to be administered with extreme caution, and in very minute doses; and its effects upon the system being vigilantly watched. In the hands of the ignorant or inexperienced it is scarcely possible to estimate the mischief it may produce; whilst under favourable circumstances it is acknowledged to be, for certain diseases, a safe and valuable remedy.

Arsenic is an active ingredient in several quack medicines. Let it be particularly noticed that *all* preparations containing Arsenic are poisonous; whether intended to be taken internally, or to be

applied externally in the forms of lotions, plasters, or ointment. In the latter case it kills more rapidly than when taken into the stomach. Hence the danger of using the various ointments and plasters which profess to be efficacious in the cure of cancer and other similar complaints. An ointment containing only one part by weight of Arsenic to thirty-two of fatty matter, was applied to a cancerous wound, the surface of which did not exceed an inch and a half in diameter, for one night only. The day following, the patient, a girl of eighteen, was seized with vomiting and violent colic, and on the second day she died with all the symptoms of having been poisoned. If we thought it necessary, we could enumerate many instances in which the most lamentable effects have accompanied the use of quack medicines. By the combined efforts of ignorance, impudence, misrepresentation and avarice, the most deleterious nostrums acquire a temporary notoriety. Their inventors very frequently become rich; whilst death, or lingering disease, is the lot of many of their credulous and misguided patrons.

Referring again to the employment of Arsenic for the most wicked and detestable of purposes, namely, the destruction of human life; we wish distinctly to state, that it is now hardly possible for any person who resorts to it with criminal intentions to escape, sooner or later, from the ignominy and punishment their guilt justly merits.

The detection of deleterious and poisonous substances in cases of sudden or suspicious illness or death, constitutes an important branch of medical jurisprudence; and there is no substance whose presence can be more satisfactorily demonstrated, and which can be more easily separated from the contents of the stomach either before or after death, than that to which we here particularly allude. By a process, the details of which would not be interesting to our general readers, but which is of the utmost importance to the chemist, as it is also to the Christian philanthropist, so small a quantity as one-twentieth of a grain of arsenic has been collected from the stomach of a person who had been poisoned. Nor must we omit to mention the antiseptic properties of arsenic, by which we mean that it preserves from decay the bodies of those whom it deprives of life. Instances are well authenticated in which the stomach and intestines of persons who had died from the effects of arsenious acid have been found, after the lapse of many months and even of years, in as perfect a state as they were at the period of dissolution. Hence we remark that the grave, instead of concealing, may be the means of preserving, evidences of guilt; and the offender, when least suspecting it, may prove the truth of that solemn declaration, "Be sure your sin will find you out.'

The effect of Arsenic upon the human body is so sudden, that unless it is speedily expelled from the stomach, there are but faint hopes of recovery. The symptoms of having swallowed this poison are the occurrence within fifteen or twenty minutes of spasmodic pains of the stomach, a sensation of heat and tightness of the head and throat, and inflammation of the eyes. To these succeed vomiting and purging, with excruciating pain of almost every part of the body, but especially of the stomach, bowels, and head. Not a moment should be lost in procuring medical assistance, and, in the mean time, the best that can be done is to excite vomiting as quickly and as easily as possible.

We are not acquainted with any antidote for Arsenic. Lime-water and magnesia are usually recommended, but these substances tend rather to produce a temporary mitigation of suffering, than to neutralize the effects of the poison. Happily there have been instances in which, by skill and promptitude, life has been preserved; but when the first alarming symptoms have abated, it is a long time before the patient can be considered in a fair way towards recovery.

In an American journal (Silliman's) for May, 1836, two cases are mentioned, on the authority of Dr. Eastman of Holles, New Hampshire, U. S., in which tobacco had been employed with complete success in counteracting the usual effects of Arsenic. The first case occurred about the year 1820, and the subject of it was Sophia, the daughter of Dr. Eastman above mentioned, who ate, by mistake, some Arsenic which had been prepared for destroying rats. Painful symptoms soon led to inquiry, when the cause was immediately discovered. An elderly lady who was present, advised that the patient should be made to vomit as soon as possible, and as she had always felt a perfect loathing for tobacco, that herb was recommended as most likely to effect the desired purpose. A pipe was accordingly used, but as that did not produce nausea, Miss E. next chewed a large quantity of strong tobacco, and swallowed the juice. To the surprise of herself and her friends, this failed in exciting even a sensation of disgust; as did also a strong decoction made with hot water, of which she drank about half a pint. But not only was the tobacco ineffective, but the painful symptoms produced by the Arsenic gradually abated, and the patient began to feel well. Physicians soon afterwards arrived, when an emetic of blue vitriol (sulphate of copper) was administered, which operated moderately once. No ill consequences followed, and in a few days Miss Eastman fully recovered her health. The other case, which happened a few years afterwards in the same place, was that of a sick person, a female, who took arsenic by mistake, and she employed tobacco with the same success as already described. In this instance no emetic was taken, nor indeed any other remedy.

During the last few months, public attention has been directed towards a practice which seems to have prevailed to an alarming extent; we allude to the use of arsenic in the manufacture of certain kinds of candles. The merit of the disclosure is due, we believe, to a medical gentleman, who first mentioned the fact in a lecture delivered by him, last summer, before the *Medico-Botanical Society*. The subject has subsequently been very ably investigated by the gentleman already referred to, in conjunction with a committee, appointed expressly for the purpose by the *Westminster Medical Society*. By the report of this committee it is clearly shown, that candles containing arsenic are sold in very considerable quantities; that they are called by a variety of names*, each manufacturer giving them a different name; that they are represented by the parties interested in their sale as being very superior to tallow, and but little inferior to wax candles, yielding light greater in quantity, and purer in quality, than other candles; that they have platted, or, as they are sometimes called, metallic wicks, and require no snuffing. It has further been shown, that the quantity of arsenic (arsenious acid,) is found to vary considerably in different candles, and in different parts of the same candle, and that from 10 to 18 grains of this poisonous substance has been obtained from a pound weight of candles. The committee have examined

* These are "German Wax Lights," "Venetian Wax Candles," "Stearine Candles," "Imperial Wax," "Moulded Wax," "Tropical Wax Candles," &c. &c.

samples of almost every kind of candle they could procure, and in no instance has arsenic been found in "the true wax-lights, the true spermaceti, and the old-fashioned composition-candles."

The injurious effects of arsenic, when diffused through the atmosphere of an apartment in which candles containing it were burning, could never for a moment be doubted by those acquainted with its properties. To set the question before the public in the strongest possible light, the committee already mentioned have conducted, with great care, a series of comparative experiments, in which birds, rabbits, and guinea-pigs were placed in boxes, and exposed, under precisely similar circumstances, to the products arising from the combustion of an equal number of candles containing arsenic, and of others which were quite pure. Our space will not permit us to give the details of these experiments; but we must not omit to mention, that they are both interesting and important, as respects the public health. During the week that these experiments were pursued, seven birds which had been exposed to the vapour of arsenical candles died, whilst the birds in the boxes where pure candles had been burning, were as gay, and ate and drank as freely, at the end of the week as they did at its commencement.

We cannot pursue this subject further. Let us, however, express a hope, that the exposure which has taken place, may lead to the immediate abandonment of a practice fraught with consequences of so dangerous a character.

AMUSEMENTS IN SCIENCE.

No. VII.

Astronomy.

In many astronomical problems, the discovery of the meridian line, that is, a line passing exactly north and south, on any part of the earth's surface, is essentially necessary. When extreme accuracy is not required, the following plans are sufficiently correct.

Suppose the meridian line to be required for the purpose of constructing a sun-dial. Having firmly fixed a piece of brass or other substance, D E, fig. 1, in some place exposed to the sun, taking especial care that its surface is perfectly level and horizontal; and on the south side of this brass plate, fix a sharp-pointed piece of iron, A: take two squares, B and C, and place them as shown in the engraving; the point where

Fig. 1.

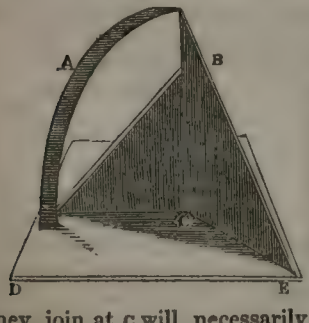
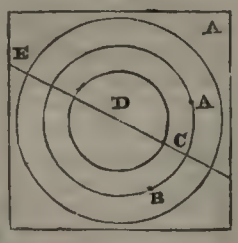


Fig. 2.



they join at C will necessarily be immediately under the pointed end of the wire; take this point as a centre and inscribe several concentric circles. Fig. 2 will explain this better. D is the point immediately under the point of the iron, and round this point several circles are drawn. An hour or two before noon mark the spot where the shadow of the iron point passes any of the circles; an hour or two after mid-day perform the same operation.

Let us suppose A and B the points on the *same* circle where the shadow crossed in the forenoon and the afternoon. Take the point C exactly midway between A and B, and from it draw a line through the centre of the circle at D. This line C D E is the meridian line of the place, and if care has been taken, its error will not be more than half a degree. The meridian line being once found, the construction of the sun-dial can be effected without difficulty.

If two men are born on the same day and hour, and die on the same day and hour, one shall appear to have lived one or even two days longer than the other.

It is well known to all navigators, that if a ship sails round the world, going from *east* to *west*, those on board, when they return, will have counted a day less than the inhabitants of the country they have sailed from, and to which they have returned. The cause of this is, that the vessel following the course of the sun, has the days longer, and in the whole number of the days reckoned during the voyage, there is necessarily one rising and setting of the sun less, visible to the crew. On the other hand, if the ship proceeds round the world from *west* to *east*, as it goes to meet the sun, the days are shorter, and during the whole circumnavigation, the people on board necessarily count one revolution of the sun more.

Supposing then, that of twin brothers one embarks on board a vessel which sails round the world from east to west and the other remains at home. When the ship returns, the inhabitants will reckon the day Thursday, while those on board the vessel will reckon it only Wednesday, and the twin who has been at sea will appear to have a day less in his life than he who has remained on shore. Consequently if they should die the same day, one of them would count a day less than the other, although they were both born on the same day.

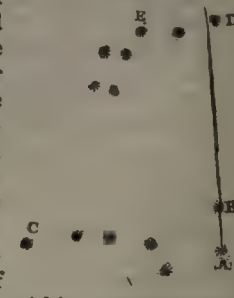
But suppose that while one was sailing from east to west, the other went round the globe from west to east; on their return their account of the time would differ by two days,—one would appear two days older than the other.

The Polar Star is nearly due north, and when neither sun nor moon are visible, and no mariner's compass at hand, it has directed the course of seamen across the trackless ocean, or been a guide to the wanderer on the land. Round this star the whole of the heavens appear to revolve. As it is not a peculiarly bright star, its beauty is not likely to attract notice, but it can be easily found by means of the splendid constellation of the Great Bear or Charles' Wain. This constellation is so extremely beautiful that it cannot fail to have been noticed by the most casual observer.

The following figure will show the method of finding the Pole Star by means of the Great Bear.

A B C represents this constellation. The two stars B and A are called the Pointers, and if a line is drawn through these in the direction of a smaller constellation, E, resembling the Great Bear in the arrangement of its stars, and known by the name of the Little Bear, the line will pass immediately under the Pole Star D. It is, as we have said, not very brilliant, but there are no stars of greater magnitude than itself within a considerable space of the heavens, for the remaining stars of the constellation of which it forms a portion, are much smaller, and only visible when the sky is particularly clear.

Fig. 3.



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THE ALBIGENSES. No. IV.

THE CASTLE OF MINERVE, IN LANGUEDOC.

CRUSADE UNDER SIMON DE MONTFORT AGAINST THE ALBIGENSES—CAPTURE OF MINERVE AND BARBARITIES COMMITTED BY THE PAPAL PARTY.

THE Castle of Minerve, situated at a short distance to the south-west of the town of St. Pons, in the South of France, was one of the strongest of the feudal fortresses which, in ancient times, so thickly covered that part of the country, and which have still left their ruins to impart a picturesque charm to its scenery at the present day. It was built upon a steep rock, surrounded by deep precipices, and from the advantages of its position was generally esteemed impregnable. It formerly gave the title of count and viscount to its possessors, and the adjacent district was called Minervois, after its name. Our engraving gives a view of the castle in its present state; the adjoining little village still preserves the name of Minerve.

In the days of its strength the castle of Minerve was a place of importance, and occupied a conspicuous station in the wars which at different times desolated the South of France. The most prominent feature, however, in its history is its capture by Simon de Montfort, during the crusade against the Albigenses, in the early part of the thirteenth century,—an event of considerable moment in the history of the crusade itself. In a former paper* we brought down the history of the persecution of the Albigenses to the period when the principal object of the first crusade against them had been accomplished by the capture of Carcassonne, in the month of August, 1209. All open resistance on their part was then at an end; but as the Pope's legate, Arnold Amabrie, Abbot of Citeaux, who had been foremost in preaching the crusade, and directing its operations, deemed the work of persecution to be yet incomplete, he conceived the diabolical design of rooting out the "pestilent heresy," by extirpating the enlightened people who had fostered it, and into whose homes he had already brought such dire calamities.

The legate's first measure was to call a council of the crusading chiefs, to provide for the disposition of the conquests which had been made by their united arms, in favour of some prince, who would undertake to complete the extermination of the Albigenses. The viscounties of Beziers and Carcassonne, whose lawful lord, Raymond-Roger, still languished in the prison to which the perfidy of Arnold had consigned him, were offered to Eudes the Third, the reigning Duke of Burgundy. This prince was one of the great lords who had engaged in this *sacred* war at

* See *Saturday Magazine*, Vol. XI., p. 97

the instigation of the monks of Citeaux; or, as a French historian of Burgundy expresses it, he had "taken the cross and joined the other lords, who, for the love of truth, and zeal for the Catholic religion, took arms to beat and destroy the Albigenses,—heretics so much the more dangerous, as they affected to follow an apostolic, penitent, and altogether disinterested life." But although the blind bigotry of Duke Eudes had led him, "for the love of truth," to make war upon the truth, he was not wanting in that sort of magnanimity and regard for justice with which knights and nobles were, or were supposed to be, inspired, in the age of chivalry. He refused the legate's offer of the territory of Raymond-Roger, saying, "That he had plenty of lordships and domains without taking that to disinherit the said viscount, and that it appeared to him that they had done him evil enough without despoiling him of his heritage."

The legate, however, was not long in finding a more pliant ally. He obtained from the council for himself, in conjunction with two bishops and four knights, full authority to settle the fate of the conquered lands; and then, in the name of this commission, offered them to Simon de Montfort, Earl of Leicester*, whose character is thus depicted by Sismondi.

This lord of a castle ten leagues from Paris, was the head of a house that had been illustrious for two hundred years, and which is traced by some to a natural son of King Robert. He had possessed the countship of Evreux, which, a few years before, he had sold to Philip Augustus; and his mother, who was an English woman, had left him, as an heritage, the Earldom of Leicester. He had distinguished himself in the fourth crusade, from which he was recently returned. Skilful as a soldier, austere in his carriage, fanatical in his religion, cruel and perfidious, he united every quality which could please a monk. He was too ambitious to refuse the offer which was made him, of elevating himself to the rank of the grand feudatories; but he still thought himself obliged to feign a refusal, very sure that they would overcome this pretended reluctance.

Simon de Montfort having accepted the proffered lands, proceeded to receive the homage of those among the vassals of the two viscounties, whom fear had inclined to submission, and brought to the camp of the crusaders; he also imposed on his new territories an annual tax payable at Rome, and issued severe decrees against all his subjects, who should not display an immediate and eager anxiety to free themselves from excommunication. In spite of the capture of Beziers† and Carcassonne‡, the two principal towns of the Albigenses, they were yet far from submitting to their persecutors, but continued bravely to hold out in the castles which abounded in the country. Many, too, of the crusaders departed from the army, their stipulated term of service,—forty days,—having expired.

Still however there remained a large force under the command of De Montfort, and after taking some castles he directed his arms against the Count of Foix, who, as well as the captive Viscount of Carcassonne, bore the name of Raymond-Roger. This count possessed the greatest part of Albigeois, which was regarded as peculiarly the seat of the new doctrines; and was even himself suspected of having secretly embraced them. Unable to contend with De Montfort, he offered to treat, after having sustained several reverses, and his antagonist deeming it politic to accept the offer, the active operations of the campaign of 1209 were, for a time, at an end.

Simon de Montfort now turned his attention towards securing himself in possession of the new states which he had acquired; and to effect that object he had recourse to a deed which has left upon his character one of the deepest of the stains disgracing it. He had observed, that although Raymond-Roger, the lawful sovereign of those states, was still allowed to be detained in prison, the hostility of many of the crusading chiefs against him was mitigated, and that, in fact, pity had succeeded in their minds to fury. The neighbours of that prince loved him; his people regretted him; and it was not impossible that his uncle and sovereign lord, the King of Arragon, might be disposed to interfere in his behalf. Accordingly De Montfort "gave the necessary orders that Raymond-Roger should die of a dysentery on the 10th of November, in a lower room of the viscountal palace at Carcassonne, where he was carefully guarded." Anxious however not to appear guilty of so heinous a crime, he displayed the body of the youthful prince to his subjects, and caused him to be buried with honour. But his efforts to conceal his villany were fruitless; the public voice accused him of having poisoned his captive.

The chief operations of the campaign of 1209 having been brought to an end, the crusaders deemed their task accomplished, and certainly they had ample reason to be satisfied with the extent of the enormities which they had committed. They had destroyed two large cities, they had slaughtered with the sword thousands of the sectaries, and compelled others to fly from their burning houses, and sink under the pressure of want in the forests and mountains. Of the princes who had excited their wrath, by wishing to maintain in their own dominions some liberty of conscience, one had perished in prison, two others had submitted, and "to make their peace, refused not their tribute to the fires of the inquisition," so that a daily sacrifice of human victims was offered up to the bigotry of these persecuting fanatics.

Sismondi observes, that those who had committed so many crimes were not, for the most part, bad men. They came from that part of Burgundy and Northern France where crimes have always been rare; but the heretics were in their eyes outcasts from the human race.

Accustomed to confide their consciences to their priests,—to hear the orders of Rome as a voice from heaven,—never to submit that which appertained to the faith to the judgment of reason,—they congratulated themselves on the horror they felt for the sectaries. The more zealous they were for the glory of God, the more ardently they laboured for the destruction of heretics, the better Christians they thought themselves.

Pope Innocent the Third, was the original instigator of the persecution of the Albigenses; and by his legates and emissaries, he "continually sharpened the sword of the murderers." The two Spaniards whom he sent into the province in 1204, and who helped to found the Inquisition, "first taught the art of seeking out in the villages those whom the priests were afterwards to fasten to their stakes." The spirit of fanaticism had been excited to frenzy by the monks over Europe. Germans came from the extremity of Austria to fight under the banners of the crusade; and the English monk, Matthew Paris, testifies to the zeal of our benighted countrymen in the same cause, and to their triumphant joy at "the miracle which had avenged the Lord," as he calls the massacre of Beziers.

The guilt, therefore, of the atrocities committed against the Albigenses, will not rest so heavily upon

* This name sounds familiar to English ears. The earl mentioned in the text was the father of that Simon de Montfort, Earl of Leicester, who usurped, as it were, the authority of the crown in the reign of Henry the Third, and terminated his ambitious career on the 4th of August, 1265, in the memorable battle of Evesham, which restored the sovereign power to its legitimate possessor.

† See *Saturday Magazine*, Vol. XI., p. 50.

‡ Ibid. Vol. XI. p. 97.

the actual perpetrators as upon the subtle instigators of them; and as Sismondi remarks, it would be to destroy the only responsibility which rests upon the powerful, the only resort for the oppressed upon this earth, not to hold up to public execration the fanatical monks who directed this movement, and the ambitious who profited by it.

The vengeance of public opinion ought not to rest only upon those who accompanied the Crusaders in their expeditions, who dragged the reformers to the flames, and who mingled their songs of triumph with the groans of their miserable victims; these were, at least, blinded by the same mad passion with which they had inspired the combatants. There was something more personal, more deliberate, more coldly ferocious, in those clouds of monks who, issuing from all the convents of the order of Citeaux, spread themselves through the states of Europe, occupied all the pulpits, appealed to all the passions to convert them into one, and showed how every vice might be expiated by crime, how remorse might be expelled by the flames of their piles, how the soul, polluted with every shameful passion, might become pure and spotless by bathing in the blood of heretics.

Towards the close of 1209, the crusaders had experienced severe reverses, nearly all the castles which they had conquered having been surprised and recaptured; so that at the end of that year, the dominion of Simon de Montfort, in Languedoc, was reduced to eight cities or castles, it having previously comprised more than two hundred. During the ensuing Winter he remained on the defensive; but with the Spring came fresh clouds of fanatics, who enabled him again to take the field in force.

De Montfort began his attacks at once upon the castles, which existed in great numbers. Many of them were, however, abandoned on the approach of the crusaders, their possessors not deeming them capable of sustaining a siege. De Montfort generally caused all their inhabitants whom he could lay hands upon, to be hanged upon gibbets. Some castles, calculating too favourably upon their strength, endeavoured to resist him; that of Brom was taken by assault the third day of the siege, and Simon de Montfort chose out more than a hundred of its wretched inhabitants, and having torn out their eyes, and cut off their noses, sent them, in that state, under the guidance of a one-eyed man, to the castle of Cabaret, to announce to the garrison of that fortress the fate which awaited them. The castle of Alairac was not taken till the eleventh day; a great part of its inhabitants were able to escape from the ferocity of the crusaders, but De Montfort massacred the remainder. Further on he found castles abandoned and absolutely empty; and, not being able to reach the men, he sent out his soldiers to destroy the surrounding vines and olive-trees.

De Montfort then conducted his army to a more important and arduous task—the siege of the castle of Minerve, situated at a small distance from Narbonne, on a steep rock surrounded by precipices, and regarded as the strongest place in the country. The castle belonged to William à Guiraud of Minerve, a vassal of the Viscounts of Carcassonne, and one of the bravest knights of the province. The army of the crusaders appeared before Minerve at the beginning of June; the Legate Arnold, and the canon Theodise, joined it soon after. The inhabitants, among whom were many who had embraced the tenets of the Albigenses, defended themselves with great valour for seven weeks; but when, on account of the heat of Summer, the water began to fail in their cisterns, they demanded a capitulation, Guiraud came himself to the camp of the crusaders one day when the legate was absent, and agreed with Simon de Montfort on conditions for the surrender of the place. As they were proceeding to execute them, the Abbot Arnold returned to the camp, and De Montfort declared that nothing which they had agreed upon could be considered as binding, till the legate had given his assent.

At these words, (says Peter de Vaux-Cernay,) the abbot was greatly afflicted. In fact, he desired that all the enemies of Christ should be put to death, but he could not take upon himself to condemn them, on account of his quality of monk and priest.

With the view, however, of creating some dispute concerning the negotiation, and thereby causing all the inhabitants to be put to the sword, he required the two negotiators, De Montfort and Guiraud, to write down without communication the conditions to which they had agreed. As Arnold had hoped would be the case, he found some difference in the statements, of which De Montfort availed himself to declare, in the name of the legate, that the negotiation was broken off. But the knight of Minerve replied, that, though he thought himself sure of his memory, yet he would accept the capitulation as Simon de Montfort had drawn it up. De Montfort, however, referred the matter to the Legate Arnold, who settled the capitulation upon the following terms:—That the Lord Guiraud and all the Catholics in the castle, and even those who had favoured the heretics, should have their lives saved—that the castle should remain in the hands of De Montfort,—and that the "perfect heretics," of whom there was a considerable number, should have their lives saved if they would become converted. When the capitulation was read in the council of war,

Robert of Mauvoisin, (says the monk of Vaux-Cernay,) a nobleman entirely devoted to the Catholic faith, cried, that the pilgrims would never consent to that; for it was not to show mercy to the heretics but to put them to death, that they had taken the cross; but the Abbot Arnold replied—Fear not, for I believe there will be very few converted.

The anticipations of the legate proved well founded. The crusaders took possession of the castle of Minerve on the 22nd of July, 1210; they entered singing *Te Deum*, and preceded by the cross and the standards of Montfort. The "heretics," as they had been styled, were in the mean time assembled, the men in one house, the women in another, and there, on their knees, and resigned to their fate, they prepared themselves by prayer, for the torments that awaited them. The Abbot of Vaux-Cernay came in pursuance of the capitulation, and began to preach to them the Catholic faith; but his auditors interrupted him by a unanimous cry,—

We will have none of your faith, (said they,) we have renounced the church of Rome: your labour is in vain for neither death nor life will make us renounce the opinions that we have embraced.

The abbot then passed to the assembly of the women, whom he found equally resolute, and more enthusiastic in their declarations. The Count de Montfort, in his turn, visited both, having already piled up an enormous mass of dry wood: "*Be converted to the Catholic faith*," said he to the assembled Albigenses, "*or ascend this pile*." None, however, were shaken. Fire was then applied to the pile, and the whole square being soon covered with a tremendous conflagration, the victims were conducted to it. Violence, however, we are told, was not necessary to compel them to enter the flames; they voluntarily precipitated themselves therein to the number of one hundred and forty, after having commended their souls to God.

These martyrs (says the historian Milner,) died in triumph, praising God that he had counted them worthy to suffer for the sake of Christ. They opposed the legate to

his face, and told Simon that on the last day, when the books should be opened, he would meet with the just judgment of God for all his cruelties.

Three women only recanted; they were forcibly held back by the noble lady of Marly, the mother of Bouchard, Lord of Montmorenci; terror and consternation succeeded to the enthusiastic fervour which had hitherto supported them, and consenting to be converted, they were saved from the flames.

AMUSEMENTS IN SCIENCE.

No. VIII.

GEOMETRY.—Part 5.

To draw a right angle without any other instrument than a straight stick and two or three pegs. Draw the straight line F A C B, and make F A, A C, and C B, equal to each other; from C draw the straight line C D *d* in any direction, make C D equal to C A, and draw the line D *h* through the point A, draw the line F G, through any part of D *h*, and make E G equal to E F. The point G will then be exactly perpendicular to A, and the line G A, when drawn, will be at right angles with A B, and consequently the angle A is a right angle.

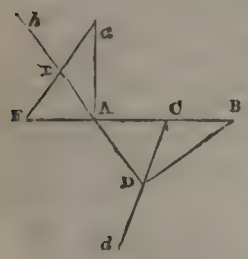


Fig. 1.

To measure the superficial contents of a rectangular piece of ground. Suppose A B to be equal to twenty feet, and C B to nine feet; multiply twenty by nine, which produces one hundred and eighty; this would be the contents of the square plot of ground A B C D, and consequently, the contents of the triangular plot would be equal to one-half one hundred and eighty, namely, ninety feet.

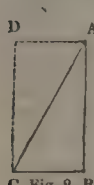
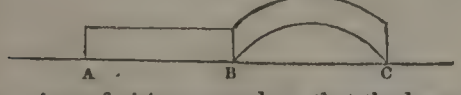


Fig. 2.

A BRICKLAYER had to construct a wall whose length in the direction A B C was twenty-four feet. The one-half of this wall, namely, from B to C, had to be built

Fig. 3.



over a piece of rising ground, so that the base of this part of the wall would necessarily be more than twelve feet. In making out his account he charged more for this half of the wall than for that which was built on level ground from A to B. A geometrician assured him that the square contents of both portions of the wall were exactly alike, which may be proved in this manner. Cut two pieces of card-

Fig. 4.

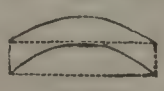


Fig. 5.

board in the form shown in figs. 4 and 5, to represent the two parts of the wall; lay the piece representing the straight wall on the curved piece, and it will be found that the angles which project at A and B will exactly fill up the spaces at E and F. The piece of pasteboard representing the straight wall, may thus be proved to be exactly sufficient to form a piece equal to that representing the curved wall. You may then lay the curved piece upon the straight one, and reversing the experiment, prove that the curved piece is capable of forming a rectangular piece equal to the other.

ON EMPLOYMENTS WHICH INJURE THE EYE-SIGHT.

No. I.

A POPULAR DESCRIPTION OF THE ORGANS OF SIGHT.

MAN in his present temporary position on the globe, is subject to all the physical laws which, under the direction of a superintending Providence, govern the universe. He is endowed with certain perceptions, by whose means alone, he communicates with the exterior world and acquires all his knowledge. These perceptive faculties are admirably fitted for use in the strict sense of the word, and it seems to be a law of nature, as rigid as it is grand and beautiful, that the natural laws are self-acting; that is, they bear with and inflict of themselves their own penalties. If, for example, we exceed the use of any one faculty; so soon as the use intended by nature is exceeded, the abuse of the faculty begins, and then also the penalty attached to the law of nature, which regulates the use, begins. Pain is the most apparent symptom of abuse, and usually accompanies it; but the most awful, and awful because mysterious, operation of the penalty is, the slow and premature loss of the use of the faculty either in part or wholly: the faculty then ceases to act; and its possessor, because he has abused one of nature's gifts, is deprived of it.

And here there is no court of appeal: it is useless to urge ignorance of the powers of the faculty, since nature began by inflicting her penalty by slow degrees, either by imparting to the possessor small increments of pain, or partial deprivation of the power of the faculty, so as to urge, as it were, upon the owner, gently, and in her own beautiful way, the necessity of complying with those laws which never vary, by chiding him for being so hard a taskmaster as to exact from a faithful servant a task which it was never calculated to supply.

Many of the arts of life furnish employments which injuriously affect the faculties of those employed in them: what these pursuits are, and how they operate, is a curious and instructive inquiry, into which, as far as respects the organ of sight, we are now about to enter, with the hope that our readers generally will find it useful, and some of them in particular will, we doubt not, find the subject one of more than common interest as it affects themselves peculiarly. We shall point out how, in many employments, the faculty of vision is injuriously affected or abused, and the simple and practicable means of removing the abuse. We select the organ* of sight as being probably the most extensively useful of all our faculties, and the one most liable to abuse.

We propose, in order to the due comprehension of our present subject, to describe the organ and function of the eye somewhat fully; and as many of the visual imperfections to be hereafter described are the results of the writer's own personal experience, the present paper may be considered partly as an exposition of the writer's own visual defects, and also how such defects may be traced to a large variety of causes more or less energetic in their action, but whose proximate operation is nearly the same.

1. The eye, which, from the wonderful power of its exterior expression, and the exquisite beauty of its internal arrangements, is said to be "Nature's masterpiece," is a globular structure placed within an orbit, or funnel-shaped cavity, on one side of the root of the nose and under the arch of the forehead. The

* We may here state, that an organ is the physiological arrangement of parts through which the function, or work done by the organ, acts. Thus the eye is the organ of sight; seeing, therefore, is the function. The ear is the organ of hearing, and hearing the function, &c.

eye-ball is a little smaller than this socket or orbit, to allow of free motion in every direction: this motion is effected by means of a muscular arrangement attached to the white of the eye, and the motion is rendered easy, and at the same time the eye is defended from injury or compression in its motion, by a quantity of fat which in health is secreted in the orbit, forming several soft cushions on which the globe of the eye rests. When this fat is absorbed by any emaciating disease, the eye sinks within its socket, and a person is then familiarly termed "hollow-eyed." The eye itself is composed chiefly of three humours (one of which is solid and the others fluid), and four membranous coats or tunics: the humours completely fill the eye, and give it its shape, and at the same time support the membranous coats. The white of the eye, or the *sclerotica*, so named from its hardness, is the exterior coat, and forms the whole of the outer eye-ball, with the exception of about one-fifth, which latter space is occupied by the *cornea*, (so called from its *horny* texture,) a transparent shield placed in front of the eye, through which the rays of light pass uninterruptedly. The cornea receives its lustre and polish from the eyelids, which are constantly engaged in folding over it; and our readers will doubtless call to mind that one of the first acts of the cold though active hand of Death, is to dull the transparency of this beautiful convex mirror, which reflects all objects presented to it; while life, health, and youth, preserve its properties unimpaired. The tendency of age is to flatten the cornea, and to diminish its transparency and polish; hence, it is said, that the eye of age is dim; and by a converse application the eye of youth is said to be lustrous, sparkling, beaming, &c., since in this case the cornea is a convex mirror, whose polish reflects light from its surface, while its transparency transmits light into the eye for the purposes of vision.

The white of the eye is lined internally with a membrane of a more delicate structure, called the choroïd coat, or tunic, which is covered with a black non-transparent pigment, placed there for the purpose of absorbing the rays of light when the purpose of vision has been served. Within the choroïd coat is the *retina*, (so called from its reticulated or net-like structure,) which is a very delicate membrane, formed from the expansion of the optic nerve, which enters the eye at a point nearly opposite the pupil. In the centre of the retina there is a small spot surrounded with a yellow margin; this spot is miscalled the *foramen centrale*, or central hole; for it is not a hole but a spot; and it is remarkable, that while the whole of the retina receives upon itself the images of external objects, and is highly susceptible of luminous impressions, the foramen centrale is incapable of luminous excitation by means of light of ordinary intensity, and it does not, as far as we know, assist the visual powers of the eye.

Behind the cornea we find a coloured membrane drawn across the eye; this membrane is called the *iris*, (a Latin word for the rainbow,) and is the distinguishing feature by which the colour of eyes is determined, its anterior surface being in some animals richly and variously coloured. The iris is perforated nearly in its centre by the pupil*, which is a hole for the admission of light into the interior chambers of the eye; and it is a fact no less extraordinary than beautiful, that the iris is furnished with a self-adjusting apparatus, to which there is no parallel throughout the whole of human invention, by means of which the pupil is contracted or enlarged, according as light is more or less abundant. In man this apparatus seems to be self-acting, and not to depend upon the will, except in a few rare cases, where individuals have been known to possess the power of spontaneously regulating the motions of the iris; but this power, like that by which a very few persons have been able to move about the outer ear, after the manner of some of the lower animals, seems lost to the great bulk of mankind. It will doubtless have been noticed, that on quitting a well-illumined room, where the pupil is small, that is, in its contracted state, in consequence of the abundant presence of light, and going out into a dark street, we are apt, at first, to suppose that the night is more than usually obscure; but, as we proceed, objects become more and more visible, and we are apt to exclaim, "It is not so dark as it was!" while, in all probability, the change, if any, is in the observer's own eye, since the fibrous arrangement which regulates the motions of the pupil, being relieved from the stimulus of a large quantity of light, gradually relaxes, and allows the pupil to expand, so as to admit as much light as possible in the obscure situation into which we now suppose it is transferred. It is believed that the motions of the pupil in the eyes of feline animals, such as cats, &c., and animals of prey generally, are voluntary; that is, they are regulated by the will of the animal, and serve the purposes of sudden and extraordinary adjustment, which may be required by the animal while engaged in its nocturnal pursuit after food.

The iris divides the interior globe of the eye into two very unequal parts, or chambers; that before the iris is called the *anterior chamber*, and contains a limpid colourless liquid, called the *aqueous humour*, from its similarity to water, and the space behind the iris (which has been called the *curtain of the eye*, from the beautiful manner in which it seems to fold and unfold), is named the *posterior chamber*, and contains a small hard double convex lens, called the crystalline lens, (from its resemblance to crystal;) and the *vitreous humour* (from its similarity to molten glass), which completely fills up all the rest of the eye.

The crystalline lens in its posterior, and most convex face, is exactly fitted to a concavity in the forepart of the vitreous humour; it is said to be enclosed in a transparent bag, called a capsula, and it is surrounded by what are termed the ciliary processes, which form an opaque circle round the lens, and impede all rays which might otherwise be transmitted by its side: the lens itself is composed of triangular pieces, which in their turn are formed of concentric scales. The substance of the lens increases in density: that is, its structure becomes more compact from the circumference to its centre, for the purpose of correcting what is called its spherical aberration †. The form of this lens varies in different animals according to their habits and places of abode. In the eye of the cod-fish it is spherical, and such of our readers as have seen a boiled cod's-head at table, will probably have noticed a white opaque ball in the eye of the animal; this is the crystalline lens of the cod-fish, which containing albumen, becomes of an opaque white, similar to the white of egg (which is almost pure albumen) when subjected to the heat of boiling water.

The vitreous humour occupies the whole of the space between the crystalline lens and the retina. This humour is contained within cells, and resembles

* The Latin word *pupilla* signifies the ball, the apple or sight of the eye.

† The object of spherical lenses is to converge the rays of light to a point or focus, but in practice it is found that the rays deviate somewhat from this point, and this deviation is called spherical aberration; the latter term implies a wandering or straying. Two causes are assigned to this phenomenon; 1st, the form of curvature of the lens; 2nd. the different refrangibilities of different rays of light.

(to use a rough analogy) honey contained in the cells of the honeycomb: this humour and the cells which contain it are both transparent.

Having thus pointed out the principal parts of the eye and their uses, we may briefly allude to a few external appendages of the same organ. The bony projection of the eyebrows forms a sort of arched abode for the eye, to shield its delicate tenant from external violence, and from too much light; and, like a projecting roof, the brow is furnished with a ridge of hairs, the eyebrows, which arrest or entangle any small substances, solid or fluid, which might otherwise fall or trickle upon the eye. The eyelids, or semi-oval curtains which cover the great aperture of the orbit, graduate the light falling upon the eye by the extent of their separation, or exclude it when they are closed, although to a small extent light does enter at the line of junction of the two lids. The eyelashes are hairs which border the edges of the lids, arranged in three or four rows. Their direction is curved; those from the upper lid proceeding upwards, and those from the under lid downwards. Their length and fulness varies in different individuals; their colour is generally that of the eyebrow, and their purpose is that of an additional screen to the eye. The lachrymal ducts in which tears are secreted, in their usual healthy and natural state, supply the eye with moisture, which is spread over its surface by means of the eyelids: these ducts are situated a little within the nose.

REVOLUTIONS OF THE SEASONS.

. . . . . I solitary court
The inspiring breeze, and meditate upon the book
Of nature, ever open; aiming thence,
Warm from the heart, to learn the moral song.

PERSONS of reflection and sensibility contemplate with interest the scenes of nature. The changes of the year impart a colour and character to their thoughts and feelings. When the seasons walk their round, when the earth buds, the corn ripens, and the leaf falls, not only are the senses impressed, but the mind is instructed; the heart is touched with sentiment, the fancy amused with visions. To a lover of nature and of wisdom, the vicissitude of seasons conveys a proof and exhibition of the wise and benevolent contrivance of the Author of all things.

When suffering the inconvenience of the ruder parts of the year we may be tempted to wonder why this rotation is necessary,—why we could not be constantly gratified with vernal bloom and fragrance, or Summer beauty and profusion. We imagine that, in a world of our creation, there would always be a blessing in the air, and flowers and fruits on the earth. The chilling blast and driving snow, the desolated field, withered foliage, and naked tree, should make no part of the scenery which we would produce. A little thought, however, is sufficient to show the folly, if not impiety, of such distrust in the appointments of the great Creator.

The succession and contrast of the seasons give scope to that care and foresight, diligence and industry, which are essential to the dignity and enjoyment of human beings, whose happiness is connected with the exertion of their faculties. With our present constitution and state, in which impressions on the senses enter so much into our pleasures and pains, and the vivacity of our sensations is affected by comparison, the uniformity and continuance of a perpetual Spring would greatly impair its pleasing effect upon our feelings.

The present distribution of the several parts of the year is evidently connected with the welfare of the whole, and the production of the greatest sum of being and enjoyment. That motion in the earth, and change of place in the sun, which cause one region of the globe to be consigned to cold, decay, and barrenness, impart to another heat and life, fertility and beauty. Whilst in our climate the earth is bound with frost, and the chilly smothering snows are falling, the inhabitants of another behold the earth first planted with vegetation and apparelled in verdure, and those of a third are rejoicing in the appointed weeks of harvest.

Each season comes attended with its benefits, and beauties, and pleasures. All are sensible of the charms of Spring. Then the senses are delighted with the feast that is furnished on every field and on every hill. The eye is sweetly delayed on every object to which it turns. It is grateful to perceive how widely, yet chastely, nature hath mixed her colours and painted her robe; how beautifully she hath scattered her blossoms and flung her odours. We listen with joy to the melody she hath awakened in the groves, and catch health from the pure and tepid gales that blow from the mountains.

When the Summer exhibits the whole force of active nature, and shines in full beauty and splendour, when the succeeding season offers its purple stores and golden grain, or displays its blended and softened tints; when the Winter puts on its sullen aspect, and brings stillness and repose, affording a respite from the labours which have occupied the preceding months, inviting us to reflection, and compensating for the want of attractions abroad by fire-side delights and home-felt joys. In all this interchange and variety we find reason to acknowledge the wise and benevolent care of the God of the seasons. We are passing from the finer to the ruder portions of the year. The sun emits a fainter beam, and the sky is frequently overcast. The garden and fields have become a waste, and the forests have shed their verdant honours. The hills are no more enlivened by the bleating of flocks, and the woodland no longer resounds with the song of birds. In these changes we see evidences of our instability, and images of our transitory state.

So flourishes and fades majestic man.

Our life is compared to a falling leaf. When we are disposed to count on protracted years, to defer any serious thoughts of futurity, and to extend our plans through a long succession of seasons, the spectacle of the fading, many-coloured woods, and the naked trees, affords a solitary admonition of our frailty. It should teach us to fill the short year of life, or that portion of it which may be allotted to us, with useful employments and harmless pleasures; to practise that industry, activity, and order, which the course of the natural world is constantly preaching.

Let not the passions blight the intellect in the spring of its advancement, nor indolence nor vice canker the promise of the heart in the blossom. Then shall the summer of life be adorned with moral beauty, the autumn yield a harvest of wisdom and virtue, and the winter of age be cheered with pleasing reflections of the past, and bright hopes of the future.—*Monthly Anthology*

THE works of nature, and the works of revelation, display religion to mankind in characters so large and visible, that those who are not quite blind may in them see and read the first principles and most necessary parts of it, and from thence penetrate into those infinite depths filled with the treasures of wisdom and knowledge.—LOCKE.

ON THE PLEASURE OF ACQUIRING KNOWLEDGE.

In every period of life, the acquisition of knowledge is one of the most pleasing employments of the human mind. But in youth, there are circumstances which make it productive of higher enjoyment. It is then that everything has the charm of novelty; that curiosity and fancy are awake; and that the heart swells with the anticipations of future eminence and utility. Even in those lower branches of instruction which we call mere accomplishments, there is something always pleasing to the young in their acquisition. They seem to become every well educated person; they adorn, if they do not dignify humanity; and, what is far more, while they give an elegant employment to the hours of leisure and relaxation, they afford a means of contributing to the purity and innocence of domestic life.

But in the acquisition of knowledge of the higher kind,—in the hours when the young gradually begin the study of the laws of nature, and of the faculties of the human mind, or of the magnificent revelations of the Gospel, there is a pleasure of a sublimer nature. The cloud, which in their infant years, seemed to cover nature from their view, begins gradually to resolve. The world in which they are placed, opens with all its wonders upon their eye; their powers of attention and observation seem to expand with the scene before them; and, while they see, for the first time, the immensity of the universe of God, and mark the majestic simplicity of those laws by which its operations are conducted, they feel as if they were awakened to a higher species of being, and admitted into nearer intercourse with the Author of Nature.

It is this period, accordingly, more than all others, that determines our hopes or fears of the future fate of the young. To feel no joy in such pursuits; to listen carelessly to the voice which brings such magnificent instruction; to see the veil raised which conceals the counsels of the Deity, and to show no emotion at the discovery, are symptoms of a weak and torpid spirit,—of a mind unworthy of the advantages it possesses, and fitted only for the humility of sensual and ignoble pleasure. Of those, on the contrary, who distinguish themselves by the love of knowledge,—who follow with ardour the career that is open to them, we are apt to form the most honourable presages. It is the character which is natural to youth, and which, therefore, promises well of their maturity. We foresee for them, at least, a life of pure and virtuous enjoyment; and we are willing to anticipate no common share of future usefulness and splendour.

In the second place, the pursuits of knowledge lead not only to happiness but to honour. "Length of days is in her right hand, and in her left are riches and honour." It is honourable to excel even in the most trifling species of knowledge, in those which can amuse only the passing hour. It is more honourable to excel in those different branches of science which are connected with the liberal professions of life, and which tend so much to the dignity and well-being of humanity. It is the means of raising the most obscure to esteem and attention; it opens to the just ambition of youth, some of the most distinguished and respected situations in society; and it places them there, with the consoling reflection, that it is to their own industry and labour, in the providence of God, that they are alone indebted for them. But, to excel in the higher attainments of knowledge,—to be distinguished in those greater pursuits which have commanded the attention, and exhausted the abilities of the wise in every former age,—is, perhaps, of all the distinctions of human understanding, the most honourable and grateful.

When we look back upon the great men who have gone before us in every part of glory, we feel our eye turn from the career of war and of ambition, and involuntarily rest upon those who have displayed the great truths of religion, who have investigated the laws of social welfare, or extended the sphere of human knowledge. These are honours, we feel, which have been gained without a crime, and which can be enjoyed without remorse. They are honours, also, which can never die,—which can shed lustre upon the humblest head,—and to which the young of every succeeding age will look up, as their brighest incentives to the pursuit of virtuous fame.——Alison.

THE FEATHER OF A PEACOCK.

In its embryo the feather of a peacock is little more than a bladder containing a fluid, while every one knows the general structure of those long ones which form the train. The star is painted on a great number of small feathers, associated in a regular plane; as those have found their way from the root, through this long space of three feet, without error of arrangement or pattern, in more millions of feathers than imagination can conceive. If this is sufficiently wonderful, the examination of each fibre of this canvass (to adopt this phrase,) will much increase the wonder. Taking one-half of the star, the places and proportions of the several colours differ in each of those, as do their lengths and obliquities, yet a single picture is produced, including ten outlines, which form also many irregular yet unvarying curves. And, further, the opposed half corresponds in every thing; while this complicated picture is not painted after the texture is formed, but each fibre takes its place ready painted, yet never failing to produce the pattern. If this is chance, the coloured threads of a tapestry might as well unite by chance to produce a picture; while every annual renewal is equally accurate, as it has been in every such animal since the creation. And whatever the other chances may be, enormous as they are against the hypothesis, this further number cannot be evaded, because it would be to abandon the very principle of chance, to say that renewal, or perpetuation, were governed by laws. If the system is to mean what it pretends to do, every feather that ever existed must have been the result of fortunate chances. This would be enough, had this object not demanded the arithmetical calculation; for, omitting all else, who would even hope to reproduce the star from the same separated materials, under any number of chances?

But the entire analysis I need not make in words; it can be done by any one on the subject itself, and with a more satisfactory effect. Let him take each fibre separately, note the number of the colours, their gradations, the very different modes of those on the different fibres, and the very different places of those colours on them, with the still more remarkable differences in those fragments of the many outlines included in the star. The painter, who best knows the difficulty of producing gradations on even a fixed plane, will best also conceive the impossibility of producing, under any number of chances, such a coloured plane, from a hundred separated fibres previously painted, or even of thus producing the much easier outlines.

But who will compute this unwieldy sum? The result alone, the figures expressing the chances against one, that this little object was not the pro-

duce of chance, would fill a page; it is equivalent to infinitude against one. Suffice it here, that I inquire of the probability of simply replacing, by chance, the disarranged and intermixed fibres of the star in their original places or order; while, even then, I need not take more than the half, as the result of the total is equally unnecessary and unwieldy. It would be a purposeless parade of arithmetic to detail those figures; if the reader will place a unit before sixty-four zeros, he will have a sufficient conception of these chances for the present purpose. And chances far short of this have ever been held competent to any proof.

[Maccuuloch *on the Attributes of God.*]

THE MANUFACTURE OF GUN-FLINTS.

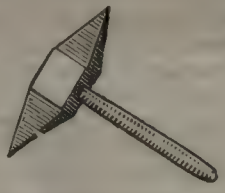
The art of forming Gun-flints was formerly kept a profound secret, at least in France and Germany. The kind of stone employed, is that species of silex, or flint, which is found in irregularly shaped lumps in the chalk formations of the earth.

The masses of flint which are best fitted for the purpose, consist of those of a convex surface, approaching to globular, the knobbed and branched flints being generally full of imperfections. The best flint nodules are in general from two to twenty pounds in weight; they should be unctuous, or rather shining, internally, with a grain so fine as to be imperceptible to the eye. The colour should be uniform in the same nodule, and may vary from honey-yellow to a blackish-brown; it is necessary that the fracture should be smooth and equal, and somewhat conchoidal, hollowed like a shell, and should be partially transparent at the thin edges.

Four tools are necessary in the manufacture of

Fig. 1.

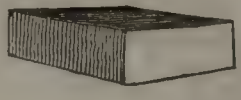
Fig. 2.



flints. 1. An iron hammer, fig. 1, with a square head, not more than two pounds in weight, and seven or eight inches in length: 2. a hammer of well-hardened steel, fig. 2, with two points, a handle seven inches long, and from ten to sixteen ounces in weight: 3. a disk hammer, or roller, fig. 3, like a solid wheel or

Fig. 3.

Fig. 4.

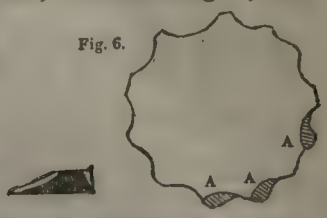


cylinder, two inches and one-third in diameter, and not exceeding twelve ounces in weight; it is made of steel not hardened, and has a handle six inches long. 4. a chisel, fig. 4, tapering and bevelled at both ends, which should be made of steel not hardened, six, seven, or eight inches long, and two inches wide. With these tools the flints are formed in the following manner:—

The workman, seated on the ground, places the nodule of flint on his left thigh, and applies slight strokes with the square hammer to divide it into smaller pieces of about a pound and a half in weight, with broad surfaces and an almost even fracture. He then holds the piece of flint in his left hand, not supported, and strikes with the pointed hammer on the edges of the great planes produced by the first breaking, by which means the white coating of the flint is removed in the form of small scales, and the mass of flint itself laid bare, as shown in fig. 5; after

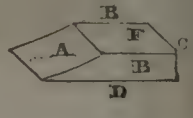
Fig. 5.

Fig. 6.



this he continues to chip off similar scaly portions from the pure mass of flints as A A A, fig. 6, which is a cross section or plan of fig. 5, the shaded portions showing the points removed at each blow. These portions are nearly an inch and a half wide, two inches and a half long, and their thickness in the middle is about one-sixth of an inch: they are slightly convex below, and consequently leave in the part of the flint from which they are separated, a space slightly concave, longitudinally bordered by two rather projecting straight lines or ridges. These ridges produced by the separation of the two scales, must naturally constitute nearly the middle of the subsequent piece; and such scales alone as have their ridges thus placed in the middle are fit for gun-flints. In this manner the workman continues to split or chip the mass of flint in various directions, until the defects usually found in the interior, render it impossible to make the fracture required, or until the piece is reduced too much to be easily broken.

To shape the gun-flint out of these scales, he selects such only as possess the requisite form; to ascertain this, it is necessary to understand the parts to be distinguished in a gun-flint. These are five in number; A the sloping facet, B B the sides, C the back, D the under surface, which should be rather convex, and F the upper facet, between the tapering edge and the back.



In order to fashion the flint, those scales are selected which contain at least one of the ridges F or A; he fixes on any tapering border of the scale to form the striking edge; he then divides the scale into pieces, of the proper width of the flint, by means of his chisel; this tool is driven into a solid block of wood, with one of its edges upwards; that part of the flint is placed across this edge where the separation is intended to take place, and a blow from the roulette, or round hammer, on the upper surface, divides it as cleanly as if it were cut; the back of the flint is then made square by the same means.

The last operation is to trim or give the flint a smooth and equal edge; this is done by turning the stone and placing the edge of its tapering edge on the chisel, and striking it a few blows with the round hammer.

THE VERNAL AND AUTUMNAL CROCUS.

Say, what impels, amidst surrounding snow
Congealed, the crocus' flamy bud to grow;
Say, what retards amidst the Summer's blaze
The autumnal bulb till pale declining days?
The God of Seasons! whose pervading power
Controls the sun, or sheds the fleecy shower;
He bids each flower his quick'ning word obey,
Or to each lingering bloom enjoins delay.

White *of Selborne.*

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QUEEN ELIZABETH; HER PROGRESSES AND PUBLIC PROCESSIONS. No. IV.

ASHRIDGE ABBEY, IN THE TIME OF QUEEN ELIZABETH.

CONDITION OF THE PRINCESS ELIZABETH IN THE REIGN OF MARY—HER ARREST AT ASHRIDGE, AND REMOVAL TO LONDON.

The death of King Edward the Sixth, which occurred on the 6th of July, 1553, was concealed for two days by the Protector, John Dudley, Duke of Northumberland, who was desirous of taking measures to secure the succession of his daughter-in-law, Lady Jane Grey, in conformity with the will which Edward had been induced to make, upon his death-bed, setting aside his sisters Mary and Elizabeth. It was important for the protector's object, that he should have the persons of the two sisters in his hands; and with this view he wrote letters in the king's name requiring their immediate attendance. Mary had nearly fallen into the snare; she was journeying to town when a secret messenger met her with a private communication of Edward's death and the machinations of Northumberland. She immediately turned her horse towards the eastern counties, and never rested till she had reached her castellated mansion of Kenninghall, in Norfolk, which lay at too great a distance from the metropolis to be suddenly surprized. Elizabeth remained tranquil at her residence in Hertfordshire, where she was waited on by Northumberland, who apprized her of Edward's death and the accession of the Lady Jane, and proposed to her that she should resign her own title to the crown in consideration of a sum of money and certain lands which should be assigned to her. With characteristic prudence Elizabeth replied, "that her elder sister, the Lady Mary, was first to be agreed withal; for as long as the said Lady Mary lived, she for her part could challenge no right at all."

The brief reign of Lady Jane Grey ended on the 20th of July; and towards the close of that month, as Queen Mary advanced at the head of her army towards London, the Princess Elizabeth went into Essex to meet her, with a large cavalcade of knights and ladies; Stow says that she was "accompanied by one thousand horse, of knights, ladies, gentlemen, and their servants." Four days afterwards she rode with the Queen to the Tower, through the richly decked streets of the city, amid the discharges of ordnance and the acclamations of the people; seven hundred and forty velvet-coated nobles and gentlemen preceded them, and one hundred and eighty ladies followed them. As an illustration, indeed, of the intimacy which at this period subsisted between the two sisters, it is related by Fox the martyrologist, that "Queen Mary when she was first queen, before she was crowned, would go no whither but would have her [the Princess Elizabeth] by the hand, and send for her to dinner and supper." According to Holinshed, when Queen Mary rode through the city towards Westminster, upon the occasion of her coronation in October 1553, the chariot in which she sat was followed by another "having a covering of cloth of silver all white, and six horses trapped with the like, wherein sat the Lady Elizabeth and the Lady Anne of Cleve." According to the Spanish ambassador then in England, Elizabeth carried the crown

which was used on that occasion; and that functionary reported to his court, that the princess whispered to Noailles, the French ambassador, that it was very heavy, and that she was tired with carrying it; and that the Frechman was heard to answer that she must be patient, and when soon placed on her own head it would seem lighter. "As the Spaniards," says Mr. Sharon Turner, "were at some distance, and could not have heard a private whisper very perfectly, we may assume that the actual speech was, 'if it were on your own head it would not seem so.'"

But the situation of Elizabeth was soon altered. When the design of Queen Mary to restore the Roman Catholic religion became apparent, the eyes of the whole Protestant party were anxiously turned towards the princess, who was well known to be attached to the reformed faith. This circumstance rendered her an object of jealousy and even of fear to the queen. The Venetian ambassador describes Mary as being "a prey to the hatred which she bears my Lady Elizabeth, and which has its source in the recollection of the wrongs she experienced on account of her mother, and in the fact that all eyes and hearts are turned towards my Lady Elizabeth as successor to the throne."

Towards the close of 1553, Queen Mary was very earnest in her endeavours to induce her sister to practise the observances of the Roman Catholic religion. Elizabeth refused to comply; and her enemies then suggested that she should be imprisoned. "I do not doubt," wrote the French ambassador to his court, "that her obstinacy will conduct her to the Tower soon after parliament meets, if things be resolved on as I think they will be." But Mary preferred endeavouring to compel her sister to conform. Elizabeth persisted in her refusal; and her conscientious preference of her own faith was imputed to seditious exhortations. The French ambassador, after relating that the princess would not hear mass nor accompany her sister to the chapel, in spite of all the remonstrances of the queen and her lords, adds, "It is feared that she is counselled and fortified in this opinion by some of the great, and that by these means some new troubles may be preparing." Again shortly afterwards he thus writes:—"The obstacle of Madame Elizabeth is not a little to be feared as up to this time she has been not at all willing to go to the mass. Last Saturday and Sunday the queen caused her to be preached to and entreated by all the great men of her council, who only drew from her at last a very rough answer." Again was her refusal imputed to disloyal machinations; and it was expected that the queen would change her household and even confine her in prison.

In the beginning of the month of December, Elizabeth obtained permission to leave the court and retire to her house at Ashridge, in Buckinghamshire. Suspicion, however, still attached to her, and she was living every hour surrounded with peril.

As the intentions of Mary (says Mr. Sharon Turner,) to bring back popery became visible, the greatest discontents began to arise, with an idea in some naturally arising from Henry's statutes against his daughter, that the young queen of Scots was the rightful heiress of the crown. But the danger to Elizabeth arose from the larger portion of the dissatisfied forming conspiracies to dispossess her sister, and to place her as a Protestant princess on the throne.

Early in the year 1554 the rash and unfortunate insurrection of Sir Thomas Wyatt broke out. Although Elizabeth had no concern in this conspiracy, it involved her in much trouble, and caused her much personal suffering. On the 5th of February, immediately after the insurrection had been suppressed, certain members of the council were sent to Ashridge with a party of horse, with orders to bring the princess to London, "either quicke or dead." The messengers "at their sodaine and unprovided commyng," to use the expressions of John Fox, the martyrologist, found her "sore sicke in her bed, and very feeble and weak of body."

Whither when they came (continues the same historian,) ascending up to her grace's privie chamber, they wylled one of her ladyes whom they met, to declare unto her grace, that there were certaine come from the court which had a message from the queene. Her grace havyng knowledge thereof, was right glad of their commyng; howbeit, being then very sicke, and the night farre spent, (which was at ten of the clocke,) she requested them by the messenger, that they wouldc resort thyther in the mornyng. To this they answered, and by the said messenger sent worde againe, that they must needes see her, and would so doo, in what case soever she were. Whereat the lady being agast, went to shewe her grace their wordes; but they hastily folowing her, came rushyng as soone as she unto her grace's chamber unbydden.

At whose sodaine commyng into her bed-chamber, her grace being not a little amased, said unto them, Is the hast such that it might not have pleased you to come to-morrow in the mornyng?

They made answere, that they were right sory to see her in that case. And I (quoth shee,) am not glad to see you here at this tyme of the night. Whereunto they answered, that they came from the queene to doo their message and duetie, which was to this effect, that the queene's pleasure was, that shee should be at London the seventh day of that present moneth. Whereunto shee saide,—Certes, no creature more glad then I to come to her majestie, beyng right sorye that I am not in case at this tyme to wayte on her, as you yourselves doo see and can wel testifie.

Indeede we see it true (quoth they), that you doo say to which we are very sorye. Albeit, we let you to understande, that our commission is such, and so strayneth us, that we must needes bryng you with us either quicke or dead. Whereat, shee beyng amased, sorowfully said, that their commission was very sore; but yet, notwithstanding shee hoped it to be otherwise and not so strayt.—Yes, verily, sayd they. * * * *

In conclusion, they wylled her to prepare agaynst the mornyng at nyne of the clocke to goe with them, declaring that they had brought with them the queene's lytter for her. After much talke, the messengers declaring there was no prolongyng of tymes and dayes, so departed to their chamber, being enterteyned and cheered as apperteyned to their worships.

On the following morning, at the hour prescribed, Elizabeth was led forth for her journey, very faint and feeble, and "in suche case that shee was redy to swound three or foure tymes" between them. "What should I speake here," exclaims John Fox, "that cannot well be expressed; what a heavy house there was to beholde the unreverend and doulefull dealyng of these men, but especially the carefull feare and captivitie of their innocent lady and maistresse."

Although Elizabeth was able to travel "with lyfe," yet her illness was so severe, that it was not until the fourth night of her journey that she reached Highgate. Here being very sick, she tarried that night and the next day; "during which time of her abode," says Fox, "there came many pursuivants and messengers from the court, but for what purpose I cannot tell." When the princess entered London, great multitudes of people came flocking about her litter which she ordered to be opened for the purpose of showing herself. The remainder of her coming into London on this occasion is thus described in an old manuscript chronicle.

The same tyme and daye, between four and fyve of the clocke at night, my lady Elizabeth's grace came to London through Smithfielde untoo Westminster, with C velvett cotts after her grace. And her grace rod in a charytt, opyn on both sydes, and her grace [had] ryding after her a

100 in cotts of fyne redde gardyd with velvett; and so through Flet-strete unto the court through the queene's garden, her grace being sycke.

Our engraving contains a view of the old abbey at Ashridge, at which Elizabeth was arrested in the manner which we have just described. This place, the name of which was formerly written *Esserugge*, *Aescrugge*, *Asserugge*, and *Ascherugge*, is in the parish of Pitstone, in the county of Hertford. It is supposed by some to have been a royal residence before the foundation of the college, as it is well known to have been after the dissolution thereof. The name is derived from "a hill set with ash-trees;" the oldest denomination of the place being *Aescrugge*, from *æsc*, as the ash-tree was first called, and *rugge*, a hill or steep place, afterwards written ridge.

The college was completed in 1285, being founded by Edmund, Earl of Cornwall, whose father Richard*, a person of high repute for his heroic endowments, had been elected king of the Romans, by the unanimous consent of the princes of the empire. It was established for a rector and twenty brethren or canons, called *Bonhommes*, a religious order which had not been previously introduced into England. They were brought out of the south of France at a time when there existed in that country a sect who called themselves *Boni Homines*, (literally *good men*), and were termed in the vulgar Gascon dialect *Los Bos Homes*.

The college at Ashridge was founded expressly in honour of the "precious blood of the holy Jesus;" and the occasion of so remarkable a dedication is thus related by Holinshed:—

Edmund, the son and heir of Richard, Earl of Cornwall, who was second son to King John, being with his father in Germany, and there beholding the reliques and other precious monuments of the ancient emperors, he espied a box of gold, by the inscription whereof he perceived (as the opinion of men then gave) that therein was contained a portion of the blood of our blessed Saviour. He therefore being desirous to have some part thereof, by fair intreaty and money obtained his desire; and brought the box over with him into England; bestowing a third part thereof after his father's decease in the abbey of Hailes, which his father had founded, and wherein his father and mother were both buried, whereby to enrich the said monastery; reserving the other two parts in his own custody; till at length, moved upon such devotion as was then used, he founded an abbey at *Asserugge*, in Hertfordshire, a little from the manor of Bercamsted, in which he placed the monks of the order of *Bonhommes* (good men), being the first that had ever been of that order in England; and assigned to them and their abbey the other two parts of the sacred blood.

In the times of ignorance the imposition was successful, and brought multitudes to Hailes and Ashridge; but when the Reformation came it was discovered and exposed. Bishop Burnet relates the manner in which the exposure took place at Hailes, telling us that the blood there was found to be that of a duck. Of that at Ashridge, Speed says,—

Ashridge was in great repute for the blood (supposed out of Christ's sides) brought out of Germany by Edmund, eldest son of Richard, King of the Romans and Earl of Cornwall: whereto resorted a great concourse of people for devotion and adoration thereof. But when the sunshine of the Gospel had pierced through such clouds of darkness, it was perceived apparently to be only honey clarified and coloured with saffron, as was openly shown at St. Paul's Cross by the Bishop of Rochester, 24th Feb. 1538.

Very soon after the foundation of the college of Ashridge, it rose to be a place of some importance; for in the year 1291, King Edward the First held a parliament in it. It remained in the hands of the Bonhommes till the 26th of Henry the Eighth, when it was visited by the royal commissioners, and the rector and brethren made their recognition of his supremacy. The rental of their estates then amounted to 447*l.* 18*s.* In the following year the first act for the Dissolution of the Monasteries was passed.

After the dissolution Ashridge became a royal residence. We know not to what tenant it was assigned during the remainder of Henry's life; but by a deed dated 24th April, in the year 1551, the house and demesnes of Ashridge were granted to Elizabeth by her brother Edward the Sixth, who is said indeed to have been nursed here. The deed in question is one of the very curious papers in the archives of the Bridgewater family, the present possessors of Ashridge; and in the same collection is another, by which it appears that, on the 28th day of March, 1556, "the right excellent Princesse, the Ladie Elizabeth's grace," leased several parcels of the lands and demesnes, and likewise the mansion and other buildings at Ashridge, for the term of twenty-one years, to one Richard Combe, of Hemelhempsted, gent., at a yearly rent of "six poundes and tenpence of lawful money of Inglande."

When she had been some time upon the throne, Elizabeth granted Ashridge for life to one of her gentlemen pensioners; and three years afterwards she granted it to John Dudley and John Ayscough, and their heirs. After passing through several hands, the property came eventually, in the reign of James the First, into the possession of Sir Thomas Egerton, Lord Ellesmere, celebrated for having been Lord Keeper to Queen Elizabeth, and Lord Chancellor to her successor King James the First. In his direct descendants, the Bridgewater family, it has remained since vested; and by one of them the old abbey was replaced some years ago, by the present structure, which is among the most magnificent modern residences in England.

Of the few letters written by the Princess Elizabeth which have been preserved, the following written to her sister Mary from Ashridge in the reign of Edward the Sixth, is interesting both as a specimen of the epistolary correspondence of the age, and as an illustration of the relation which subsisted between the sisters before the accession of Mary.

The Princess Elizabeth to the Princess Mary.

Good sistar, as to hire of your siknes is unpleasant to me, so is it nothinge feareful, for that I understand it is your olde gest that is wont oft to visit you, whose comminge thogth it be oft yet is it never welcome, but notwithstanding it is comfortable for that "jacula prævisa minus feriunt." And as I do understande your nede of Jane Russel's service, so am I sory that it is by my man's occasion letted, wiche if I had knowen afore I wold have caused his wil give place to nede of her service, for as it is her duty to obey his commandement, so is it his part to attende your pleasure; and as I confesse it were miter [meeter] for him to go to her sins she attendes uppon you, so indide he required the same but for that divers of his felowes had busines abrode that made his tarijnge at home. Good sistar, thogth I have good cause to thanke you for your oft sendinge to me, yet I have more occasion to rendre you my harty thankes for your gentil writinge, which how paynful it is to you I may wel gesse by my selfe, and you may wel se by my writitige so oft how pleasant it is to me. And thus I ende to troble you, desiring God to sende you as wel to do as you can thinke and wische or I desire or pray. From Hasherige, scribled this 27th of October.

Your lovinge Sistar,
ELIZABETH.

To my well-beloved Sistar Marye.

* It was this Earl Richard to whom the Pope Innocent the Fourth offered the kingdom of Sicily and Naples, but upon so many inadmissible conditions, that the earl's agent at Rome observed, "You might as well say to my lord and master, 'I sell or give you the moon; climb up, catch it and take it.'"

THE HOUSE I LIVE IN.

No. V.

Man's body's like a house; his greater bones
Are the main timber; and the lesser ones
Are smaller joints; his ribs are laths daubed o'er,
Plastered with flesh and blood; his mouth's the door,
His throat's the narrow entry, and his heart
Is the great chamber full of curious art.
His midriff is a large partition wall
'Twixt the great chamber and the spacious hall;
His stomach is the kitchen, where the meat
Is often put half sod for want of heat.
His spleen's a vessel Nature doth allot,
To take the scum that rises from the pot;
His lungs are like the bellows that respire,
In every office, quickening every fire;
His nose the chimney is, whereby are vented
Such fumes as with the bellows are augmented;
His bowels are the sink, whose parts to drain
All noisome filth, and keep the kitchen clean;
His eyes are crystal windows clear and bright,
Let in the object, and let out the sight;
And as the timber is, or great, or small,
Or strong or weak, 'tis apt to stand or fall.—Quarles.

The House I live in differs in some respects, as we have already seen, from many buildings. An ordinary building of wood, brick, or stone, is intended to stand firmly, no part, excepting the doors and windows, being made for motion. The ends of each part are usually fitted together by square-edged joints, with great exactness, and the frame is kept together by girths, braces, &c.

There are indeed a few parts of the House I occupy, which are not intended to have much motion; but in general the reverse is the case. Even the girths and braces are designed to regulate and direct its movements, but not entirely to prevent them. The joints, instead of being framed together by means of tenons and mortices, and kept as dry as possible, are rounded and made smooth, and moistened by a sort of oil, to suit them for motion, rather than to hinder it.

There are indeed a few joints—if joints they ought to be called—which are firm and unyielding; I mean the teeth. These, as we have already seen, are set into the jaw-bones, as firmly as are tenons into mortices, and even more so. They seem to stand there like nails or spikes, when driven into planks or timbers. The bones of the head, too, are joined firmly together in adults, as you have already been told.

Some of the joints of the human frame are real hinges. To this class belong the knee-joints, the joints of the toes and finger, and those of the elbow. The lower jaw may also be called a hinge-joint. The ankle-joints, the joints of the wrists, and indeed many others, sometimes move like hinges, but they perform other and very different motions besides.

HIP JOINT.

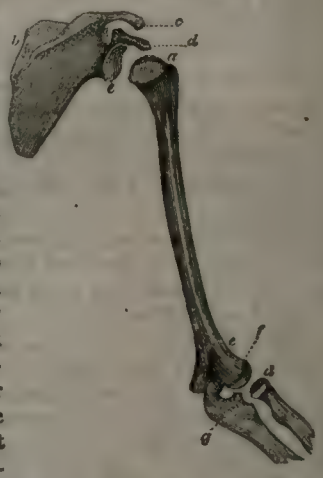
But the most curious joints in the human frame are what are called the ball-and-socket joints. The more important of these are the shoulder and the hip.

At *a* you see the deep hollow or socket in the bone, where the round head of the *femur*, or thigh bone, moves. This round head is drawn back from the bottom of the socket a little way, in order to show the round ligament near *a*. The latter is a very tough, strong cord, fixed by one end at the bottom of the socket, very firmly, and by the other fastened as strongly to the round head of the femur. If it were not for this ligament, the joint would be dislocated, or slipped out of its place, a thousand times more frequently than at present; for now indeed this but seldom happens. Around the socket at the hip is a tough, gristly rim, which greatly increases its depth. This socket is called the *acetabulum;* meaning vinegar-cup. It was supposed to resemble a kind of ancient vinegar-cup in use among the Romans.

HIP JOINT.

Annexed is a figure of another ball-and-socket joint, and also of a hinge-joint—the shoulder being an illustration of the ball working in a socket, and the elbow acting upon the principle of a hinge. Every one understands the nature of a hinge, which is in such constant use, and therefore the motion of the elbow-joint will be very readily understood.

Let us examine the joint of the elbow. The lower portion of the arm is formed of two bones, one large, called the *ulna*, and the other smaller, called the *radius*. The upper end of the small bone *d*, is a little rounded, and it lies against a small hollow, or depression, in the other bone, the ulna, at *g*, to which it is tied by cords, called ligaments, particularly by one which goes round it like a band. The ends of these two bones, thus united, turn on the end of the upper one, which is rounded and tipped with cartilage, and thus fitted for the purpose, as we see at *f*. They are kept together in a living person, (as indeed all bones are,) by broad and short straps or cords, called ligaments, which adhere to each end of the bone a little way from the joint, and are very tight and strong, and yet not so tight as to hinder the proper degree of motion.



To enjoy the entire use of the arm, two distinct motions are requisite, which may be employed separately or together, at will. For this purpose, while one of the bones of the fore-arm only, the *ulna*, is attached to the *humerus*, or bone of the upper-arm, the smaller bone of the fore-arm, or *radius*, is enabled to move in a hollow, or depression of the ulna, by means of its rounded upper end. At the lower end of the arm, this arrangement is reversed; the radius, instead of furnishing the head, becomes in turn the receiver, and the prominence of the ulna plays within a depression on its surface. By means of this reversed arrangement, the greatest freedom of motion is admitted, and, by the greater pliability which is gained, fractures and dislocations rendered less likely to occur.

But a ball-and-socket joint is more curious still. The bone which is represented at *b*, is the *scapula*, or shoulder-blade. The hollow place at *e*, is the socket in which the round head or ball, *a*, of the upper bone of the arm, (the humerus,) plays freely, when the arm is moved. The socket is so shallow, and the ligaments so long, in order to enable us to make almost every kind of motion with our arms, that it is much more easily slipped out of joint, or dislocated, than are the hinge-joints. Even the hip, which is also a ball-and-socket joint, has a much deeper socket; and it is partly on this account, and by a different arragement of muscles, that we cannot

swing our legs round with as much freedom as we can our arms.

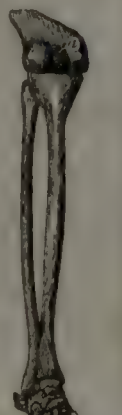
The number of hinge and other joints in the frame of the House I live in is very great. It must be nearly, if not quite, a hundred and fifty.

You see the wisdom of the great Creator fully displayed in this structure and connexion of the bones. What if the joint of the knee could move in every direction, like that of the shoulder? Do you not see that when we walked, the legs would have dangled about strangely, instead of moving backwards and forwards in one direction only? And is it not plain that we never could have stood firmly on the ground? In like manner, how very inconvenient it would have been, to have our finger-joints move one way as well as another! On the contrary, how confined and cramped would have been the motion of the arm, if the shoulder had been like the knee, and had only permitted the arm to swing backwards and forwards, without our being able to carry it outward from the body!

LIGAMENTS.

But how are the joints held in their places? When we take up a bone which has lain, perhaps for years, bleaching in the sun and rain, we see that the ends are smooth, and some of them hinge-like; but if we take up two such bones, and put them together, they will not stay in that condition a moment, unless they are fastened by strings or wires, or something of the kind. How, then, are they kept together in the living person? This is what I am now about to tell you.

They are held together by short and strong straps, called *ligaments*. Some of them, however, are longer, and begin at a considerable distance, say an inch or two, from the very end of one bone, and then, after passing over the joint, are fastened into the next. This strap, or ligament, does not adhere or stick to the joint, as it passes loosely over it, but is only fastened strongly, where it rises, and where it is inserted, as if it were there glued to the bone. The inside, where, in crossing, it lies against or rests gently on the joint, is very smooth; so that the joint, in moving, may not grate or wear out.



These ligaments are white and shining, but not always very thick. They are usually very strong. Some of them are as narrow as a piece of tape. Others, as at the sides of the knee, or at the shoulder, are very wide. Some cross each other, as in the knee-joint. The latter are shown in the engraving, *a*. There are others that go all round the joint, and completely shut it up: as if the ends of the two bones were put into the two open ends of a short cylinder, or rather of a short bag or purse, and the open ends were then gathered round, and fastened tightly to the two bones; in this way, the joint would be completely shut up, as in a sack. This sort of ligament is called a *capsular* ligament. It would be difficult, nay, even impossible, to enumerate all the ligaments in the body, they are in many instances so interwoven with each other, and frequently inseparably united. It will be sufficient here to mention that the junction of the head with the spine, the whole length of the spine itself, the hand and the foot, are literally crowded with ligaments of different shapes and attachments, as may be best adapted for imparting strength and flexibility; and that each of the larger joints has several ligaments in connexion with it, the knee-joint alone being considered by some anatomists as having fourteen distinct ligaments to its own use.

The bags, or sacs, called *capsular ligaments*, are principally intended to prevent the joint from being easily slipped out, or dislocated. They also serve for another purpose, scarcely less important—a purpose which shows the wisdom of the great Creator in the contrivance of the human frame, more than almost any other; if, indeed, any comparison can be made where all is excellent.

The Father of the universe is the preserver as well as the creator of this "wondrous frame." Was there not something done to keep these joints oiled, if I may so call it, they would not last long. Take the knee, for example; and think what a vast deal of friction or rubbing together of the end of the thigh-bone and of the two leg-bones there must be.

A traveller probably swings each leg, in walking, about 1200 times in a mile. If he should walk thirty miles a day all the year excepting Sundays, he would swing each knee 15,024,000 times. Were he to do this every year, from the time he was twenty years old till he was seventy, or for a period of half a century, the number of movements would be 751,200,000 times! Now this continued rubbing of the bones of the knee together, if they were allowed to get dry, would wear them so much in a single day, that we should hear a grating noise at every step, long before night, and, in a very few days, the bones would be completely worn out and unfit for use. I question if they would last even a whole day. Iron or steel would wear out in a very short time. What, then, can be the reason why the knees and all the other joints do not wear out?

I have said that many of the joints are completely shut up, as if they were in a sack. Now the great Contriver of the animal frame has so contrived it, that a substance, called *synovia*, which answers all the purpose of oil or tar, continually oozes out on the inside of the ligaments at the joints, and keeps the ligaments themselves, and the joints, soft and moist. The synovia, or liquor which thus oozes out to lubricate the joints, is of just the right quality and quantity when we are in perfect health. If we are unwell, there may be too little or too much, or it may be too thick or too thin. If we use food or drink that is too heating or irritating, the synovia will become less in quantity or of poorer quality.

In these, and in other evils, prevention is better than cure. Those who live on moderate food, and avoid strong drinks, and work steadily but moderately, rarely have any trouble of this sort.

It has been said, that the ligaments hold the joints together. They do so; but the tendons or straps, which go off from the ends of the muscles, and are fastened into the several bones around their joints, materially help to hold them together. There are other wonderful contrivances to keep the joints firm and yet moveable, into which we cannot at present go.

That the great Creator made the joints to be used, is proved from their curious structure, and from the substance prepared to moisten them; but that they were not made to be used too violently is also proved by the fact, that if thus used, they become diseased. Sometimes the liquor called the *synovia* dries away; in these cases the limb becomes stiff and incapable of motion; at others, the joints become painful and often enlarged. It is but seldom, however, that they become diseased from mere exercise, provided our habits are temperate and regular; though occasionally rheumatic, and other painful affections, will encroach upon the ease of our sensations and the symmetry of our forms.

THE DUTCH FISHERIES.

No. I.

The Herring Fishery.

The Dutch have three sorts of fisheries,—the Herring, the Cod, and the Whale. Formerly the Herring Fishery was the chief branch of their industry, their grand source of wealth; it was called, at the time we refer to, the golden mine of the republic. Though still their principal fishery, it has much declined since the beginning of the last century. On the establishment of the French domination in Holland it fell to nothing; revived at the restoration, but has not yet reached its ancient prosperity. The monument raised in the fifteenth century, at Berliet, in honour of William Beukelson, who first discovered the art of curing herrings, shows how much importance was attached at that early period to this branch of trade. The first cause of its decline lay in the wars of Holland, during the latter part of the eighteenth entury, when English vessels cruised continually in the North Sea, and captured the Dutch fishing vessels. Again, during what the Dutch called the French epoch, the period during which Holland shared all the fortunes of France, she had to submit to the consequences of such an alliance. France, though triumphant on the Continent, was, so to speak, besieged in all her ports, and Holland, a country essentially maritime, was in the same plight. Such fishing vessels as ventured out to sea were almost invariably made prizes of, especially near the mouth of the Maas, where English men-of-war were sure to be on the look out for them. Besides, the Dutch in general considered themselves as in a conquered country, an idea which encouraged all sorts of disorders. Smuggling was considered lawful, the fishery regulations were neglected, and what herring was caught, was cured so ill as to become spoilt when exported.

Vlaardingen, on the right bank of the Maas, and two leagues from where that river joins the sea, is the only town whose inhabitants now carry on the fishery with spirit; they employ in it about 100 vessels. A century and a half ago, Brouwershaven, in Zealand, sent out 200, but that port is now deserted. Maassluis, at the mouth of the Maas, once counted 200, and has now only 20; Amsterdam has 15; Enkhuizen, on the Zuyder-Zee, instead of 200 which it once had, has now but three or four. Excepting Amsterdam, these towns had no other trade, and now their deserted harbours seem as if waiting for some new commerce to infuse a second life into them. Vlaardingen alone has escaped the general ruin, and continues to thrive; its fishing fleets are sent out by persons owning one or more vessels individually, or by joint-stock companies, owning up to 20.

The greater number of vessels destined to the herring fishing, return from that for cod, towards the end of May, or early in June. Tarring, painting, engaging men, providing stores, and preparing sails and rigging, create a deal of bustle for a fortnight among the population of Vlaardingen, who amount to about 17,000.

On the 10th or the 11th of June the captains and officers present themselves at the town-house, and swear that they will observe themselves, and see to the observance by others, of the fishery regulations; this done each hoists his colours. On the 14th of June, called colours' day, the people go to church, and pray to God for a blessing on the expedition. On leaving church they parade about the harbour, where the vessels are curiously placed, each having its prow turned right in shore, and its bow-sprit passing over the quay. They are all in beautiful order, and having their flags displayed, make a handsome appearance. Among the flags, one larger than the rest is hoisted astern, bearing the vessel's name, in gilt or black letters, on the white streak, the national flag having three horizontal streaks or bands. Crowds of curious persons come in from the neighbourhood, and as an eight days' fair commences at the same time, Vlaardingen wears a most animated appearance.

It is usual at this time to go on board the vessels, and drink good health and a prosperous voyage to the captain, who regales his guests either in his little cabin or under an awning on deck. Generally, too, the owners and their friends visit the captain on board his ship, as well as his own friends and family.

In former times much importance was attached to the sailing of the fleet on the 15th of June; but now, should the wind prove adverse, the vessels leave the harbour and lie at anchor in the Maas for two or three days, after which they must put to sea, or forfeit the government bounty.

The fleet is attended by an extra ship, or tender, carrying additional hands to take the place of such as fall ill or meet with accidents; properly speaking, it is a moving hospital (*ambulance*). It cruises for a fortnight with the fleet, receiving the sick and disabled seamen, and replacing them with others; it then makes for Shetland Bay, in the islands of that name forming the northern extremity of Scotland, and the centre of the fishing operations; there it spends a fortnight in attending to the recovery of its invalids; that period expired, it rejoins the fleet and cruises for another fortnight, returning the cured seamen to their respective vessels, and taking back the men it had left to supply their place. Thus it alternates during the whole of the fishing season. The men often injure their hands with the nets, which excoriate their fingers and impregnate them with salt, although fenced with gloves of leather, doubled with thick worsted Iceland gloves.

The tender which thus convoys the fleet has a carpenter and a cooper on board; these repair damages, and are of the utmost use. It has also an officer attached to it, who is specially charged with maintaining a strict observance of the fishing regulations, and with the prevention of smuggling in the Shetland Islands; he acts, indeed, as a sort of commissioner from the government.

The fishing is carried on from the 24th of June to the 30th of October. Twelve of the fastest sailing vessels are selected to carry home the first-caught herrings with the utmost speed. These vessels, called *jagers*, (chasers,) are under orders of one of their own number as admiral's ship. Each chaser has, in addition to its ordinary crew, an officer, called *koopman*, who keeps an exact account of the herrings taken on board, and of the vessels that supplied them.

The fleet generally proceeds as far as Hookness, but it is not easy to say where the herrings are found in greatest plenty. The fishermen go northward or southward, according to their knowledge of the habits of the fish, or their experience, and often according to orders from the owners. Herring caught towards the north is preferable to that caught towards the south, the flavour being infinitely superior.

It is forbidden to fish within five miles of the Scotch coast, by common accord of the British and Dutch governments; the former as a check upon smuggling, the latter because the herring caught near the land has the spawning sickness (*kuitziekte*). Britain insists, also, that rigorous measures be taken to prevent fraud. The luckless seamen who may be caught passing gin or tobacco into the hands of

smugglers in Shetland Bay, are condemned by the Scotch judges to fines and imprisonment; the sentence is intimated to the captain of the person convicted, and executed on his return to Holland.

On the 24th of June the nets are shot into the sea, and to fish sooner is forbidden, in order that all may start fair. That day accordingly is not forgotten at Vlaardingen; the owners meet together and dine; happy in the prospect of the success each anticipates for himself, many a toast is drank to the prosperity of the expedition.

The fishing once commenced, the chasers above mentioned cruise about in all directions, and collect the first-caught herrings; these are again transferred to the vessel selected to sail first until its freight is full; then a second is freighted, and so on. As each receives its complement of herrings, or when the proper moment for sailing homewards has arrived, the admiral authorizes their departure by signing the koopman's invoice; this goes on until its own turn arrives, and then his ship sails the last.

The freight of the chaser first despatched is generally from 16 to 20 tons, that of the second 60, and so on, augmenting as the value of the herring falls, that of the admiral being above 300 tons. The chasers often come to port without a full freight, either from the fishing being bad, or from the time lost in the freighting of those sent first, leaving not enough of time to freight the remainder. When the season is far advanced, the admiral must send them off, else they might arrive all at once, and produce a glut of herring following on a scarcity. The chasers are called first, second, and so on, in the order of their leaving the fishing ground, not in that of their arrival at Vlaardingen; for it may happen that the fifth, for example, by meeting with contrary winds, or by being damaged in a gale, may come into port after the sixth. Once discharged, they may put to sea again as fishing vessels, whereas before they were not allowed to fish. All ought to have returned to port by the 4th of August, up to which date the fishing vessels are not allowed to come in and sell their herrings in competition with what the chasers have brought. Should any be forced to return in consequence of damages sustained at sea, the herring it has caught since the freighting of the last chaser, is not allowed to be sold until the 4th of August; if any arrives in port after the day fixed for their return, it is sent away to a foreign port. The captains are bound on oath to hand over all the herrings they take to the chasers, until the whole up to the last are freighted. The regulation which obliges chasers arriving past their time to go to a foreign port is a very wise one, for thus all the proprietors of vessels forming part of the chasers' union, participate in the loss; this late arrival, however, seldom happens.

Moreover, all are not despatched to the port from which they sailed. The first always makes for Vlaardingen, the second for Hamburgh, the third for Maasslüis, and so on; but Vlaardingen is the resort of several, and always of the admiral. It is a good speculation to send a chaser to Hamburgh, for if it arrive before the Embden fishermen, it is sure to sell its herrings well.

The produce of all the herrings sold by the chasers is thrown into a common fund, and distributed among the members of the union, according to the quantity of fish supplied by the fishing vessels belonging to each, and charged against the common fund.

The arrival of the first chaser at Vlaardingen is a real fête; it generally takes place about the end of June, or beginning of July. From the moment that the vessel is expected, two men are posted at the top of the town steeple, with their eyes turned the whole day towards the sea. On descrying the expected chaser in the offing, notice is sent to the owners, and to the families of the men who form its crew; a flag also is hoisted from the steeple as a signal.

No sooner is this flag perceived throughout the town and neighbourhood than a cry of joy resounds on every side; the inhabitants meet in the streets, everything gives note that the port is about to resume its activity, after being like a desert since the fleet sailed. The quay, and the street leading to it, are crowded; each wants to know what proportion his friends or relatives have contributed to the freight of herring, and this is soon known, as the koopman lands in a pinnace with the invoice in his hand, and gives it to one of the owners who reads it aloud. The vessel is straightway moored, and discharges its precious cargo, which is generally sold at 800 florins the ton. But before allowing the sale to commence, two carriages are despatched with the first-fruits to the king and his ministers. Each is attended by two personages, one of whom drives while the other waves a flag. Their mission is not without fatigue and danger, for they must gallop all the way, but the king in return gives them a gratuity.

For the last five years there has been an association of shipowners, connected with the herring trade. It enjoys the protection of the government, and all must join it or forfeit their claim to the bounty, amounting to 700 florins. This association buys all the herring brought in by the fishing vessels, at prices fixed by a commission, but in reselling them it is free. The price fixed for the first ten vessels is higher than for the next ten, and the fall continues down to a minimum of 17 florins for the barrel of full herrings; above that for the *maatjen*, or best quality, and less for inferior qualities, such as the spawn-sick herring, (*kuitziek*,) the weak, (*sleppen*,) the *ijlen*, the *vrakken*, &c. The *maatjen* are the fry of the preceding year, hence small sized but good, and in great request. The *sleppen* come from barrels which have somehow or other lost their salt, which makes the fish soft and insipid.

Since the close of the French epoch, laws have been made on the manner of salting the herrings, and these are strictly observed. The sailors must put so much salt into each barrel; this preserves the fish, and has produced a revival of the trade. The Baltic, the north of Germany, and the interior of Holland, consume the greater part, and part goes also to the East Indies.

The fresh-herring fishery is carried on at Scheveningen, a village on the North Sea coast, about three miles from the Hague, and also by the inhabitants of the shores of the Zuyder-Zee. The vessels sent out from Scheveningen to this fishery are called bommens; they are flat, and far from elegant; this form is given them as a security against accidents among the numerous shoals and sand-banks of that coast. These bommens are of small size, and never go very far out to sea. The boats employed in the Zuyder-Zee are shaped differently, and have various other names, such as *pinkens*, *sookkers*, *hengstens*, &c. The same sort of craft may be seen at Scheveningen, but only for the petty fishing on the coast.

The herring caught off Scheveningen and in the Zuyder-Zee is, in a great measure, affected with the spawning sickness. It is smoked for a single night and sold as sour herring (bokking); or, after being smoked for several days, it is sold as English sour herring, which is the better way. It is eaten also without being smoked.

As the vessels destined for the great fishery are

forbidden to land unsalted herring, in like manner are the Scheveningen and Zuyder-Zee fishers forbidden to salt theirs. The reason is very simple. Great as is the abundance of herrings caught near the coast, the quality is inferior, and but for such prohibitions, the cost and trouble of procuring the rarer herring found on the north of Scotland, might deter persons from going for it. That taken so easily on the Dutch coast might engross the market, and so people would have bad fish at home, and the foreign trade would be injured; for even when salted the herring caught near the coast corrupts and becomes unwholesome food.

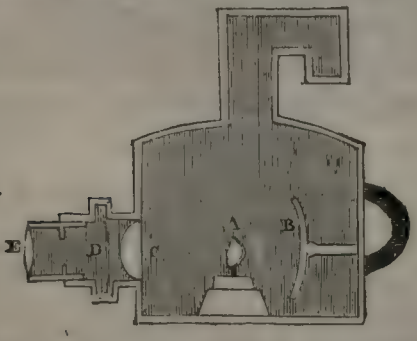
Notwithstanding this, the abundance found in the Zuyder-Zee has given rise to a sort of commerce which must injure the salt-herring trade, and affect the health of consumers. For some years past Frenchmen have gone into the Zuyder-Zee, and bought herrings from the coasting fishers; these they gut and salt on board their own vessels, and then take them to France, where they are sold as herrings caught out at sea. These speculators come from Dieppe, Dunkirk, and other less considerable ports.

THE MAGIC LANTERN AND PHANTASMAGORIA.

THE Magic Lantern, so well known for its amusing effects, was invented by the celebrated German philosopher Kircher, who lived at the beginning of the seventeenth century. The principle on which it is constructed is much the same as that of the Camera Obscura*, but the arrangement is materially different.

Fig. 1 represents a section of the lantern, showing the internal arrangement of the lenses; A is a lamp

Fig. 1.



enclosed in the lantern, which is so formed as to allow no light to escape except through the double convex lens, E. The rays of light from the lamp which fall on the concave mirror, B, are reflected towards the nearly hemispherical lens, C, by which they are condensed, and pass on to the glass slide, on which the objects are painted in transparent colours, at D.

The image of the object at D is magnified in passing through the lens at E, and is ultimately received on a white screen placed at some distance in front. The lens E is fixed in a sliding tube to allow it to be adjusted to the distance of the screen from the lantern, so as to produce a clear image of the object.

The instrument is made more perfect if two lenses

Fig. 2.

are employed, as shown in fig. 2, instead of a single lens, E. In these arrangements the following are considered the best relative forms of the lenses and mirror.

* See *Saturday Magazine* Vol. XI., p. 72.

The concave mirror may be of any concavity required, but the flame of the lamp must be placed as nearly as possible in the *principal focal distance* of the mirror, which may be found in the following manner. Suppose A B, fig. 3, to be a section of a concave mirror, the curve of which could be described by placing one foot of a pair of compasses in the point C; if a line is drawn from C to the centre of the mirror at E, the point D, midway between C and E, will be the principal focal distance, and the rays of light received from the lamp by the mirror, will be reflected in parallel lines so as to fall with equal intensity upon the lens C (see fig. 1.) This lens must be of such a power that its focus shall be at or near the surface of the glass on which the picture is painted; the focus of a double convex lens in which the curves on both sides are alike, is equal to the diameter of a circle, of which its curve forms a portion. Thus, suppose B, fig. 4, to represent a lens, whose curved surface would form part of the circle, C D; by the rule given, the distance of its focus from the centre of the lens would be equal to A B.

Fig. 3.

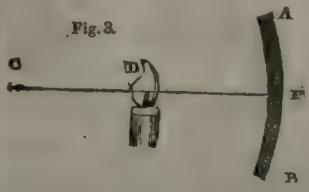
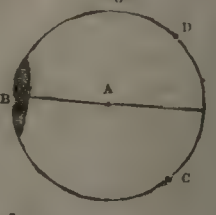


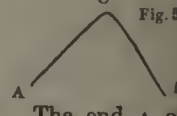
Fig. 4.



The Phantasmagoria produces its effects by the same optical arrangement as the Magic Lantern, but the pictures differ in having their back ground painted black, and instead of their being exhibited on a white opaque screen, they are seen through a transparent screen of calico oiled or wetted. The lantern is mounted on wheels, so as to be steadily rolled to a greater or a shorter distance from the transparent screen behind which it is placed, by this means increasing or diminishing the size of the projected image. In some cases, instead of being rolled along a platform or table, it is strapped round the body of the operator, who advances or recedes from the screen.

Another contrivance is attached to the lantern of the Phantasmagoria, which is not found in the Magic Lantern. The front lens of the instrument, instead of being fixed in a sliding tube, is placed at the end of a leather case containing a spring, whose action keeps it pressed outwards, acting like an old fashioned powder-puff. Two levers, A C and B C, fig. 5, are employed in the following manner, to regulate the action of this spring, and consequently bring the glass at its extremity nearer to, or allow it to recede further from, the slide on which the figures are painted. The end A of the lever A C, is fixed to the framework of the lantern nearest the exhibiter, where it works on a centre; at C it is attached to the lever C B, and the end B of this lever is fixed to the extremity of the leather tube, in the same manner as A is to the lantern, consequently, by bringing A and B nearer to each other, the glass is drawn back, and the spring of the tube itself will act in the contrary direction when left at liberty to do so. The object of this contrivance is to keep the lens at a proper focal distance from the screen.

Fig. 5.



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THE RHINE. No. V.

THE MICE-TOWER, AND CASTLE OF EHRENFELS.

THE RHEINGAU—THE MICE-TOWER—THE CASTLE OF EHRENFELS.

Here Nature stood still, strewing with lavish hand,
Her living beauty over hills and valleys,
With lingering step
Adorning the landscape.

In a former paper* we gave a description of the little duchy of Nassau, which is bounded along its southern and western frontiers by the river Rhine. We now proceed to speak of that remarkably fertile and beautiful portion of it which lies between the border of the river and the Taunus Mountains, and which is known as the *Rheingau*, or district of the Rhine. It is a narrow strip of country, rather more than nine English miles in length, and of a varying breadth, never exceeding four miles. Its eastern limit, or the beginning of it to a traveller descending the Rhine, is at Wallauf, a little below Mentz, and its western limit or termination at Lorchausen; at least the tract comprised between these limits is that to which the name of Rheingau is generally applied by tourists, though, properly speaking, its eastern extremity is at Schierstein, a little above Wallauf, and its western extremity a little above Lorchausen.

The Rheingau is celebrated over Europe for the loveliness of its scenery and the rich produce of its soil. Among the different wines with which we are acquainted at the present day, those of the Rhine hold a high place; and of the wines of the Rhine there are none which can be put in comparison with those which are produced in the Rheingau.

This paradise, (says a German writer, the Baron Von Gerning,) like the region of Naples, may be styled a portion of heaven fallen down to the earth. The majestic Rhine lingers in his course through it, and in honour of it forms nine verdant islands. The solemn Taunus throws his woody arms around it to protect it from the rough and boisterous north. Vine-covered hills, fields, and meadows, and human dwellings, are intermingled most agreeably; and in this Elysium we fly from place to place, in an overpowering ecstasy which defies description. Hallgarten, a village in the forest, with its Hyndelberg adorned with vines, lies in a charming situation close to the wood-covered heights. The well-preserved castle of Volrats has a most picturesque appearance amid its soft hills behind the beautifully enthroned Johannesberg. Further back the ruins of the burg of Scharfeustein, on a rocky vine-covered mountain, towers above the wooded valley of Kiderich. The mild vineyards stretch sweetly round the golden Markt-brunner Stralenberg, down to a narrow causeway (which is throughout protected by an old railing, but cut by a parapet wall), between Erbach and Hattenheim, where the important frontier fountain pours itself with a pleasing murmur into a sandstone basin (in the chapel, fitted up with elegant seats, erected in honour of it in the celebrated vintage-year 1811,) in order that travellers may refresh themselves with the water as well as the wine of Mark-Brunn. A beautiful range of vine-hills again follows; we approach the Johannesberg, the Rothenberg, (so called from the red colour of its soil), and the Niederwald, and everything assumes a more gay and southern appearance. A road of five leagues in length from Schierstein, the commencement of the modern Rheingau, to Rüdesheim, comes

* See *Saturday Magazine*, Vol. XI., p. 233.

in contact with eight other places, namely, Walluf, Elfeld, Erbach, Hattenheim, Oesterich, Mittelheim, Winkel, and Geisenheim, most of which are surrounded by beautiful country seats, presenting a series of the most agreeable pictures to the delighted eye, and putting the friend of antiquity in mind of the villas of the Romans. Geisenheim, the streets of which are still unpaved, and which may be considered as a large village, has something distinguished and solemn about it in this respect. The Rhine between this place and Galshein, is more than half a league in breadth, which is the greatest breadth it ever attains between Basle and Holland, and the green-coloured majestic stream has now all the appearance of a lake.

The Rheingau was originally a free Salic possession, and was divided into the Upper and Lower Bounds; the former comprehending the district along the mountains, and the latter the district along the banks of the river. It was next divided into Rhine townships and Forest townships; the frontier of the latter being protected by five strong bulwarks, which lowered immediately above the principal passes. Beyond this line were some Forest villages and cantons, over which the rulers of the Rheingau possessed a criminal jurisdiction, and which took part in the district assemblies. The whole territory was protected on the forest side by a frontier intrenchment, consisting of hedges and underwood tangled and plashed together, a species of barricade called *gebück*, which enabled its defenders in the Thirty Years' War, to obstruct for some time the progress of their antagonists.

In the stirring and vigorous times of the middle ages, the inhabitants of the Rheingau were exposed to frequent feuds. In the thirteenth century they still had their particular *gaugraves*, or "counts of the gau." This noble tract of country passed by degrees into the hands of the Archbishops of Mentz; and when it was finally united to their domains, the place of the *gaugraves* was supplied by vicegerents. The inhabitants had their separate constitution, defensive institutions, liberties and privileges, without the confirmation of which they would not pay homage to a new ruler. Additional rights and liberties were conferred on them by the Archbishop Adolphus the Second, whom they assisted in 1462 against Diether and the citizens of Mentz. They were also exempted from feudal service and compulsory military duty:

They have a common saying among them that "the air of the Rheingau makes a man free." The old national maxim of Germany, "What we were not consulted in, that we will not assist in executing," was peculiarly in force among them. According to the descriptions of former times, the Rheingau was "a free, obedient, incomparable portion of the territory of the church of Mentz." In return for the immunities respecting markets and customs, which they enjoyed, the inhabitants of the Rheingau preserved from the year 1200 the right of defence of the town of Mentz, a right which they still exercised in 1792. . . . . The inhabitants of the Rheingau are kind, frank, hospitable, and, generally speaking, endowed with a certain innate hilarity which well becomes them. As the district was itself separated from the adjacent country by the Rhine and a trench, its inhabitants were in like manner a separate people. They yet form, as it were, only one family, especially the inhabitants of Rüdesheim, who are almost all related to each other, and who seldom marry elsewhere. Persons when they meet greet each other with the words, "Good time!" which, in a bad time, sounded doubly grateful.

The most delightful period of the year in the Rheingau is the season in which the vine puts forth its blossoms, when the whole country is filled with the most delightful fragrance, and that in which its ripened fruits are gathered and their juice expressed for the wine-making. The men and women connected with the cultivation of the vine at times form processions with music and singing; in the ceremonies which accompany the end of the vintage a female is elected "wine-matron." With respect to climate, the Rheingau is spoken of as being indisputably the most southern zone in Germany. The road from Geisenheim to Rüdesheim is the most beautiful of the whole Rheingau; and a row of walnut and elm-trees affords also that grateful shade which is the more to be valued, because it is so seldom met with, in this wine-region, where greater attention is generally paid to the culture of the grape than to that of ornamental or fruit-trees.

The appearance of the Rheingau from the overhanging hills which divide it from the inland upper country of Nassau is very fine. The author of *Bubbles from the Brunnens of Nassau*, speaking of a view from one of the summits, a hill near the monastery of Eberbach, characterizes it as being, without any exception, the finest he had witnessed in the country.

Uninterrupted by anything but its own long narrow islands, I beheld the course of the river from Johannisberg to Mainz, which two points formed from the grotto where I stood an angle of about one hundred and twenty degrees. Between me and the water lay, basking in sunshine, the Rhinegau covered with vineyards, or surrounded by large patches of corn which were evidently just ready for the sickle; but the harvest not having actually commenced, the only moving objects in the picture were young women with white handkerchiefs on their heads busily pruning the vines; and the Cöln [Cologne], or as it might more properly be termed, the *English* steam-boat, which immediately before me was gliding against the stream towards Mainz. On the opposite side of the Rhine an immense country highly cultivated, but without a fence, was to be seen.

The Baron Von Gerning compares this enchanting tract of country when viewed from an adjacent height, to "a carpet of delight, skilfully woven by the formative hand of nature."

> A vale of pleasance spreads beneath our feet;
> The plains adorned with golden grain, the heights
> With golden grapes. Village to village joins;
> For where the earth the lightest toil rewards,
> With lavish hand does man delight to build.

The natural advantages of the Rheingau will appear the more strikingly to the traveller, if he first traverse a portion of the upper country of Nassau, and then descend to the Taunus mountains. Every step that he takes in the descent will introduce him to a more genial climate and vegetation. In the summer-season the contrast will be particularly striking. Instead of breathing the keen light mountain air which appertains to the upper country, he feels himself overpowered by the burning sun, which is hurrying to maturity the abundant crops around him. The luxuriance which Nature has imparted to the vegetation of the Rheingau is not more remarkable than its variety. A writer already quoted, took the trouble to note down the different crops which he passed in riding from Frauenstein, which lies low in the Taunus range, to Mentz; and he gives the following list as well calculated to convey "some idea of the produce of the highly-favoured belt or district of Nassau, (known by the name of the Rheingau,) which lies between the bottom of the Taunus hills and the Rhine:—

Vineyards,	Potatoes,	Horse chestnuts,
Hop-gardens,	Carrots,	Almonds,
Fields of kidney beans,	Turnips,	Quinces,
Tobacco,	Clover of various sorts,	Medlars,
Hemp,	Grass,	Figs,
Flax,	Lucerne,	Wild Raspberries,
Buck-wheat,	Tares,	—— Gooseberries,
Kohl-rabi,	Plum-trees of various	—— Strawberries,
Mangel-wurzel,	sorts,	Currants,
Fields of beans & peas,	Standard apricots,	Gooseberries,
Indian corn,	Peaches,	Whortleberries,
Wheat of various sorts,	Nectarines,	Rhubarb,
Barley,	Walnuts,	Cabbages of all sorts,
Oats,	Pears, } of various	Garlick,
Rye,	Apples, } sorts,	Tomatos
Rape	Spanish chestnuts,	

A part of the Rheingau mountains lying behind Rüdesheim, is occupied by the forest of the Neiderwald. It is richly wooded; and the charming situation of its summit induced the former possessor to build an edifice on it, which cost him above half a million of florins, (about 55,500*l.*), and which is very much visited. The principal part of it is a hunting castle, which stands at the extremity of the forest near the Rhine; its position, however, is not quite in front, so that the view which it commands of the Rhine, although very romantic, is confined.

The view from a small temple over the best part of the Rheingau, (says Von Gerning,) the picturesque islands of the Rhine, and the majestic stream which spreads itself out like a lake, and in which everything is reflected as in a mirror, is altogether unique and exquisitely beautiful. At one time we imagine ourselves by the lakes of Zurich and Bienne; at another by the lake of Lugano, and then again we feel ourselves transported to the charming regions of Italy, which, however, possesses no river like the Rhine.

A still more beautiful view is obtained from the summit of an old tower called the Rossel, which stands at the extremity of the cliff overhanging the river, and lying above the ruined castle of Ehrenfels, whence the spectator sees the Rochusburg beneath him on the opposite side of the river, the winding river Nahe almost at his feet, with the town of Brugen and its ancient ruins, and the Mausethurn or Mice-tower on its little island in the middle of the Rhine. This prospect is thus described by the author of *Bubbles from the Brunnens of Nassau*:—

We ascended through a noble oak wood, until reaching a most celebrated pinnacle of the Taunus mountains, we arrived at the Rossel, an old ruined castle, which standing on the Niderwald, like a weather-beaten sentinel at his post, seemed to be faithfully guarding the entrance of that strange mysterious chasm, through which, at an immense depth beneath, the river was triumphantly and majestically flowing. Although the view from the ruined top of this castle was very extensive and magnificent, yet the dark, struggling river was so remarkable an object that it at first completely engrossed my attention. While the great mass of water continued to flow on its course, a sort of civil war was raging between various particles of the element. In some places an eddy seemed to be rebelliously trying to stem the stream, in others the water was slowly revolving in a circle;—here it was seen tumbling and breaking over a sunken rock—there as smooth as glass. In the middle of these fractious scenes, there lay, as it were, calmly at anchor, two or three islands, covered with poplars and willows, upon one of which stood the ruins of the Mausethurn, or tower of that stingy Bishop of Mainz, famous, or rather infamous, in the history of the Rhine, for having been gnawed to death by rats. On the opposite side of the river were to be seen the Rochus Capille, a tower built to commemorate the cessation of the plague, the beautiful castle of Rheinstein, the residence of Prince Frederick, of Prussia, the blue slated town of Brugen, with its bridge crossing the Nahe, which running at right angles into the Rhine, here delivers up its waters. The difference in cast of colour between the two rivers at their point of meeting is very remarkable, the Rhine being clear and green, the Nahe a deep muddy brown; however, they no sooner enter the chasm in the Taunus hills, than the distinction is annihilated in the violent hubble-bubble commotions which ensue. The view beyond these home objects now attracted my attention. The Prussian hills opposite were richly clothed with wood, while on their left lay prostrate the province of Darmstadt, a large brown flat space studded, as far as the eye could reach; with villages, which, though distinctly remarkable in the foreground, were yet scarcely perceptible in the perspective. Behind my back was the duchy of Nassau, with several old ruined castles perched on the pinnacles of the wood-covered hills of the Niderwald.

The endless succession of ancient dilapidated castles which impart such "a Gothic and poetical interest" to the banks of the Rhine, have been generally spoken of by travellers with all the rapture of romantic enthusiasm; but there are some writers who have viewed them in a light rather colder but more correct. As mere objects in the scenery, they are not the most attractive sort of castellated ruins;—the eternal round tower, or "stone cylinder," which generally stands out most conspicuously, is spoken of as the very reverse of picturesque:—

There is besides a moral feeling attached to them, (to quote the author of a *Family Tour,*) that is apt to carry the recollection back to those days of feudal tenure when murder and robbery were hardly considered as crimes; and when many an unhappy victim lingered out a miserable existence in the cells and dungeons of these ancient ruins, which still remain as memorials of the villainous scenes that have been transacted within their walls. A French writer, however, thinks otherwise; he tells us how delighted he feels in transporting himself in imagination to those remote ages of ancient chivalry—those ages, as he calls them, of valour and virtue—in imagining himself to be surrounded by those *preux chevaliers*, the protectors of weakness, the defenders of a sex which knew no other ornament but delicacy and gentility. Perhaps he would have been nearer the truth, if instead of preux chevaliers he had painted these castles to his mind as the retreats of bands of brigands.

This is unquestionably the less romantic, but by far the more correct mode of viewing the subject. We may be unwilling to adopt it always, because the attractions of chivalry are apt to captivate our imaginations, and the blessings which we fortunately enjoy under the present system of European civilization, leave us unable to estimate the weight of sufferings to which all peaceable persons were exposed in the age when it flourished. The very ruins that we speak of, themselves tell the tale of the oppression to which they were made subservient; in most cases the lords of these ancient castles provoked their destruction by their own rapacity. Some six or seven hundred years ago, instead of displaying their prowess against the Saracens and Turks abroad, they preferred the more profitable and less perilous occupation of pillaging poor merchants and peaceful towns at home; their feats in this line became at last so oppressive, that a general league was formed against them among their victims. The result of it was successful; the citizens were too strong for the knights, and the haunts of the "patrician highwaymen" were many of them burnt into the picturesque ruins, which, with a little aid from time, they still exhibit. Doubtless, in some cases, a castle may have been erected by its master to protect the traders—or (what was something gained) to secure them from being pillaged by anybody but himself; but, in all probability, for every one that was so built to foster the interests of commerce, there were a dozen devoted to the plunder of the poor merchants who were engaged in carrying it on.

None so little enjoy life, and are such burdens to themselves, as those who have nothing to do. The active only have the true relish of life. He who knows not what it is to labour, knows not what it is to enjoy. Recreation is only valuable as it unbends us; the idle know nothing of it. It is exertion that renders rest delightful, and sleep sweet and undisturbed. That the happiness of life depends on the regular prosecution of some laudable purpose, or lawful calling, which engages, helps, and enlivens all our powers, let those bear witness who, after spending years in active usefulness, retire to enjoy themselves,—they are a burden to themselves.—Joy.

To see nothing out what is good is impossible, and to say nothing but what is good would be deceitful; but it is the part of both wisdom and charity to see all that there is, and to say all that we can. There is a great deal of latent good which must be looked for before it can be found, but which is worth finding, and, therefore, worth looking for. —*Quarterly Review.*

ILLUSTRATIONS OF THE BIBLE FROM THE MONUMENTS OF ANTIQUITY.

No. X.

The Plagues of Egypt.

The portion of history on which we are about to enter has always been regarded of the highest importance. The signs and wonders which God "multiplied in the land of Egypt," (Exod. vii. 3,) were so stupendous in their nature, and decisive in their character, that they have ever been the first objects of attack by the sceptic and the infidel. On this account we shall a little enlarge the scope of our illustrations, and combine with the monumental records those independent traditions of Arabia which have been preserved in the Koran and the early Saracenic histories. It has been asked, why memorials of such great events as the ten plagues have not been discovered on the Egyptian monuments? we have anticipated a decisive answer by showing that the objects of divine vengeance were not the native Egyptians, but an intrusive race of conquerors; and this view of the case is confirmed by the Arabian writers, who declare that the Pharaoh by whom the Israelites were persecuted, was a chieftain named Walid, of the house of Amalek. There can be no doubt that the different wandering tribes of Western Asia, frequently united in their plundering expeditions into Egypt; and whether Pharaoh the Fourth was an Amalekite or not, the fierce animosity of the Amalekites against the Israelites is in a great degree explained by the tradition that the deliverance of the latter precipitated the overthrow of the empire which the house of Amalek had established in Lower Egypt.

The narrative of the Grecian historians confirms this explanation; they tell us that the expulsion of the Hyksos from Lower Egypt was accomplished by one of the Theban kings, but they do not explain by what event the foreign conquerors were so weakened as to become the prey of those over whom they had triumphed so recently and so decisively. The only plausible reason that can be assigned for the sudden prostration of the Hyksos, is the overthrow of Pharaoh's host in the Red Sea; after such a calamity the intrusive conquerors must have been unable to maintain their ground, and must have been as decisively vanquished as the monuments represent them to have been. National vanity induced the Egyptians to suppress the fact that God's interference in behalf of another people was the chief cause of their national triumph; just as, in modern times, in many Russian accounts of the battle of Pultowa, the defeat of Charles the Twelfth is ascribed wholly to the prowess of Peter the Great, and not a word is said of the intense frost which had previously destroyed the flower of the Swedish army.

This view of the case serves also to explain another objection very frequently urged by infidels, the absence in Scripture of any reference to the name and conquests of Sesostris; but if the preceding reasoning be correct, that mighty victor must have acquired his trophies while the Israelites were wandering in the desert, and necessarily removed from his line of march. It is, perhaps, no groundless conjecture, that God designedly placed his chosen people in sequestered security, while the Egyptian victor pursued his rapid career and prepared the way for more permanent conquests.

When Moses and Aaron were sent to bear the message of Jehovah to Pharaoh, each held a rod, which seems to have been a symbol of priestly dignity among the Egyptians, as it is still among many oriental nations. The Arabian traditions respecting this rod are manifestly borrowed from the fables of the Talmud, but they are so far worthy of notice, as they prove that a rod was considered the ensign of a prophet or an inspired person, for they say it was given to Moses by his father-in-law, Shoaib or Jethro, whom all the traditions represent as a preacher of the true religion.

The figure of Ammon, a well-known Egyptian deity, in the accompanying engraving, bears in the right hand the sacred *tau*, supposed to have been the symbol of vital energy, and in the left a rod or sceptre, such as we may suppose Moses and the Egyptian magicians to have used, especially if, as seems exceedingly probable, the Egyptian magicians belonged to the sacerdotal caste. When Moses and Aaron appeared before Pharaoh, the latter "cast down his rod before Pharaoh and before his servants, and it became a serpent." We have already seen from the monuments that something of a sacred character was attributed to serpents by the ancient Egyptians, and that the first appeal made to Pharaoh was consequently the most likely to influence his decision.

"Then Pharaoh called also the wise men and the sorcerers; now the magicians of Egypt, they also did in like manner with their enchantments." (Exod. vii. 11.) There are three different words used here to designate the Egyptian enchanters,—*chakamim* which simply signifies "wise men," but in Scripture is usually confined to those who attend in royal courts; *mekashephim*, which signifies "mutterers of incantations," and comes from a root primarily signifying "to pray;" but this root and its derivatives is restricted in Hebrew to idolatrous services; and *chartummim*, which is derived from a word signifying "engraving," and therefore most probably means "persons skilled in hieroglyphics." The word *lehatim*, translated "enchantments," also signifies "flames," and this we shall see is of some importance in examining the character of the magicians.

It deserves to be remarked in the first place, that all the eastern traditions concur in representing the wonders of the Egyptian magicians as pure deceptions. This is the express testimony of the Talmud

and the Koran. Such arts might not easily have been imposed upon a native Egyptian, but a barbarous foreigner like the Pharaoh of the Hyksos, might easily have been duped by the superior skill of "wise men" instructed in the knowledge and arts of the Egyptians. When the descendants of Timúr established their empire at Delhi, they were similarly dazzled by the tricks of the Hindú conjurors. The Emperor Jehangueir informs us, that even his father, the enlightened Akbar, consulted some of these soothsayers before setting out on an expedition, and found their predictions verified by the event. He also gives us the particulars of an exhibition in his own court by some jugglers from Bengal, which far surpasses that of the Egyptian sorcerers in the court of Pharaoh. The following extracts from the emperor's autobiography, cannot fail to interest the reader.

They (the jugglers) took a small bag, and having first shown that it was entirely empty, one of them put his hand into the bag; on withdrawing his hand again, out came two game cocks of the largest size and great beauty, which immediately assailing each other, fought with such force and fury that their wings emitted fire at every stroke. This continued for the full space of an astronomical hour, when they put an end to the combat by throwing a sheet over the animals. Again they withdrew the sheet, and there appeared a brace of partridges with the most beautiful and brilliant plumage, which immediately began to tune their throats as if there were nothing human present; pecking at worms with the same sort of chuckle as they are heard to use on the hill side. The sheet was now thrown, as in the other instance, over the partridges, and when again withdrawn, instead of those beautiful birds, there appeared two frightful black snakes with flat heads and crimson bellies, which with open mouth and head erect, and coiled together, attacked each other with the greatest fury, and so continued to do, until, as it appeared, they became quite exhausted, when they fell asunder. The sheet was thrown over as before, and when finally withdrawn, there appeared not a vestige of the snakes nor of anything else.

One of the seven men stood up before me (says the emperor,) and setting open his mouth, out came the head of a snake. Another of the men seized the snake and drew it out by the neck to the length of four cubits. This being disposed of by casting it to the ground, another followed in the same manner, and so on to the number of eight, none of them being less than four or five cubits in length. These being all cast loose upon the ground, were immediately seen writhing in the folds of each other, and tearing one another with the greatest fury; a spectacle not less strange than frightful.

It would be no difficult matter to collect numerous anecdotes of the wonders performed by the conjurors and snake-charmers of the East; some of which even now puzzle enlightened Europeans, and consequently may well have deceived such a prince as the fourth Pharaoh. But the miracle wrought by Moses was uncontrovertibly proved to be supernatural, for Aaron's rod swallowed up the rods of the magicians.

Untaught by this unequivocal manifestation of the Divine power, the wicked ruler of Egypt refused to let the Israelites depart, and the first plague was inflicted both as a chastisement and a warning:—

And Moses and Aaron did so, as the Lord commanded; and he lifted up the rod, and smote the waters that were in the river, in the sight of Pharaoh and in the sight of his servants; and all the waters that were in the river were turned to blood. And the fish that was in the river died; and the river stank, and the Egyptians could not drink of the water of the river; and there was blood throughout all the land of Egypt. (Exod. vii. 20, 21.)

The most striking monument of the severity of this plague is the river itself. From the earliest ages the Nile has been the great source of support to the inhabitants of Egypt; by its overflowings the land is fertilized; in every season its bed is nearly full, and its inundations occur at the period of the year when the heat of a scorching sun has dried up all other streams. In most lands, the overflowing of a river is the signal of wide-spreading calamity, and diffuses universal consternation; the overflowing of the Nile, on the contrary, is the announcement of fertility to all who dwell upon its banks; the rising of the waters is hailed by benedictions, thanksgivings, and songs of triumph; even the slave bowed down by toil, and the Fellah sinking under oppression, share the general joy, and for a day forget the cruelties of man in contemplating the bounties of nature. The ancient Egyptians ascribed a divine origin to the river, believing it an emanation from Knouph, or Cneph, whom they regarded as the father of the gods; and on one of the monuments, that deity is depicted pouring forth water from a vase, as a type of the inundations which were to fertilize the land. Even at the present day, many of the native Egyptians, both Christian and Mohammedan, believe that the Nile flows from the terrestrial paradise, while others think that it is a copy of a celestial Nile which flows through the mansions of the blessed.

The waters of the river are supposed to be peculiarly wholesome and sweet; indeed, the Turks frequently stimulate themselves to artificial thirst by eating salt, in order that they may drink the more of this delicious beverage. All travellers, ancient and modern, unite in praising the water; it is even asserted by some, that it has valuable medicinal qualities, and that the cattle which drink of it become more fat and more fruitful than those fed on the banks of any other river. A river so justly valued and even revered as a divinity, was now rendered an object of disgust and abhorrence; it is therefore impossible to conceive a miracle more striking or more likely to effect the purpose for which it was designed.

ON WRITING MATERIALS.

No. III.

The History of a Black-Lead Pencil.

There are probably but few of our readers who imagine, while using a black-lead pencil, that that useful little instrument is, and long has been, a source of much wealth to some of our countrymen. Such, however, is the case; for nearly three hundred years, the black lead (the essential part of a black-lead pencil,) has been derived from our own mineral treasures in a state of greater purity, and in more abundant supply than in any other part of the world. It is a remarkable circumstance in the mineralogical history of our globe, that almost every substance which is useful to man, appears to have some particular locale in which it is found more abundantly than at any other spot. This locality, therefore, becomes the mart from which other nations are supplied; until at length, a new deposit, or a new mine, is discovered in another place, and draws away, and often with ruinous effect, the traffic from the before-favoured spot. Black lead, for instance, has been found in many parts of the world, in a state of greater or less purity; but when the celebrated Borrowdale mine*, in Cumberland, was discovered, the others shrunk into insignificance, and the "crayons d'Angleterre" have become the standard of excellence all over the Continent. It has lately been stated in an American scientific work, that a black-lead mine was worked in Massachusets by the French residents about a century ago; but it was long abandoned, and has only recently been prosecuted, but with such success that it promises to yield a very abundant supply.

* See *Saturday Magazine*, Vol. I., p. 24.

In order to give a tolerably complete history of a black-lead pencil, we will first describe the materials used, and then the process of manufacture. In the first place we must state, that black-*lead* pencil is altogether a misnomer, there being not a particle of lead in the manufacture. The marking material is plumbago, or graphite, a compound of carbon and iron, in the proportion of nine parts of carbon to one of iron. This mineral is of a dark iron-black colour, passing into steel gray. It occurs in a massy form, in kidney-shaped lumps, varying from the size of a pea to much larger lumps, and is found in beds of quartz, and in masses of calcareous earth. It has a glistening metallic lustre, and the fracture presents a texture somewhat between scaly and granular. The large masses are slaty in their appearance, and occur generally in distinct concretions. It takes a considerable polish by rubbing, and, as is well known, gives a dark lead-gray streak when drawn along paper or wood. It is unctuous to the feel and not very brittle, and about twice as heavy as its own bulk of water. The large quantity of carbon which it contains, renders it peculiarly fitted to the purposes of the chemist, in the form of crucibles, as it will bear an intense heat. The other purposes to which it is applied, are to relieve friction in the axes and pivots of wheels. Its power this way may be illustrated by rubbing a button first on a plain board, five or six times, and applying it to a bit of phosphorus, the latter will immediately burn. When rubbed on a surface covered with plumbago, double or treble the friction will be required to produce the same effect. Plumbago is also used to give a polish to shot and gunpowder, to give a preservative coating to cast iron, and to mix with clay to form a lining for furnaces. At North Carolina shingles are coated with a mixture of black lead and oil, which is said to be an excellent preservation against fire. For all these latter purposes, however, coarse and impure black lead is employed.

Borrowdale, to which we have alluded, is situated in the heart of the lake district of Cumberland, a district which, for natural scenery and for poetic association, connected with the eminent men who have lived, and still live there, is a favourite spot with English tourists. In the reign of Elizabeth there was a mine of copper and lead in the immediate vicinity, which was worked by some Germans; but on finding some small veins of gold and silver in the mine, a contest arose with the crown as to who should possess the precious metals; Elizabeth gained the contest, and the Germans soon afterwards left the country. About that period, however, the Borrowdale black-lead mine was discovered, and soon drew attention to its valuable contents. Its celebrity gradually increased, and with it an extensive system of purloining. Sometimes the workmen in a neighbouring mine would cut through into the black-lead mine and carry off quantities of the contents. At another time a party of miners overcame a guard placed at the entrance of the mine, and kept possession of the whole place for several days. An Act of Parliament was obtained in the last century, inflicting severe penalties on all depredators, and since then an improved mode of protection has been devised.

The mountain which contains this valuable mine, is situated at a few miles from Keswick, and is about 2000 feet high. The entrance to the mine is about 1000 feet from the level of the ground, from which spot there is an excavated cavity, extending 660 feet horizontally into the body of the mountain; this passage has a railway laid along its whole length, and is used to convey the ore from the bowels of the mountain to the entrance

A few particulars concerning this mine were given by Campbell, in his Political History of Great Britain, about fifty or sixty years ago. He says,—

The mine before mentioned is private property, is opened but once in seven years, and the quantity known to be equal to the consumption in that space sold at once; and as it is used without any preparation, it is more valuable than the ore of any metal found in this island. But there is nothing improbable, and much less impossible, in supposing that other, and it may be many other, uses will be discovered in medicine, painting, dyeing, varnishing, or pottery, which would certainly contribute to raise the value of a mineral peculiar to this country, and with the nature of which, though so long in our possession, we are still so imperfectly acquainted.

Some part of this surmise has been realized since Mr. Campbell's days, and it may all be so. By far the best account of this mine which we have met with is that of Mr. Parkes, who visited it in 1814.

There are two entrances to the mine,—a small one by which the workmen descend by means of a flight of steps, and the other is a large horizontal one, capable of admitting hand-carts and wheel-barrows for the removal of the rubbish and loose earth by which the black lead is enveloped, and through this entrance the water passes off which constantly runs through the mine.

In order to secure the vast treasure which is contained within this mountain, the proprietors have now erected a strong brick building, consisting of four rooms on the ground floor, one of which is immediately over the opening by which the workmen enter the mine as they go to their work. This opening is secured by a trap door, and the room conected with it is called the dressing room, for when the men enter it, they strip off their usual clothes, and each of them puts on a dress suitable for working in a mine. The men work six hours each, and then they are relieved by others.

As the black lead is cleaned, it is put into firm casks which hold about one hundred and twelve pounds each, and these are sent by waggon to the warehouse of the proprietors in London. Formerly, this mine was opened but once in seven years: but in consequence of the demand being greater, and the quantity which they have discovered not being so large, it has been found expedient to open it and dig for ore during six or seven weeks every year. During this time the mine is guarded night and day. In consequence of the mines having been opened in late years every Summer, they now raise all the black lead they find, and then the mine is securely shut in the following manner:—The workmen wheel back the rubbish which had been removed at the opening of the mine, and this is laid on in a continued heap, to the amount of some hundred cart loads, which securely blocks up both the passages into the mine. The door is then locked as well as the door into the house, and all the men thus leave the premises in a state of safety; for the mass of rubbish which is thus wheeled in at the large door, dams up the small rill of water which usually flows through the mine, and thus has the effect of flooding it completely. Thus, if an attempt were made to break the house and enter the mine by that road, the robbers would find that the water had risen to such a height as would drown any individual who should attempt to search for the ore.

Our readers may be surprised at the extreme caution displayed in every part of these processes, as described by Mr. Parkes, to prevent purloining, &c., but this surprise will cease when we recollect the value of the ore; the market price of the best black lead being nearly half the price of pure silver, about two guineas per pound. Various shafts are excavated in this mine, some of which appear to be exhausted, which occasions a search for new veins in other directions. One mass was discovered in 1803, measuring twenty-one yards and a half in length, and two and a half in diameter.

The property of this mine is shared between a a few individuals, and to show its great value, Mr. Parkes states that in sixteen years, from 1798 to 1814, 2552 casks, of one hundred and twelve pounds each, were procured from this mine: of which 736

were fine, and 1816 coarse. This we shall find to give an average, one year with another, of 17,864 lbs.; indeed, the nett profits have been known to be between 20 and 30,000*l.* in one year. The reason why this mine is so particularly valuable, is to be found in the circumstance that the ore requires scarcely any labour to fit it for the market, it being originally almost in a pure state.

Perhaps one of the most remarkable circumstances connected with plumbago is the mode in which it is sold. After the quantity necessary for supplying the market during the ensuing year is extracted from the mine, and the latter closed up, the product is carried in small fragments of about three or four inches long, to London, where it is exposed for sale at the black-lead market, which is held on the first Monday of every month, at a public house in Essex Street, Strand. The buyers, who amount to about seven or eight individuals, examine every piece with a sharp instrument to ascertain its hardness, those which are too soft being rejected. The individual who has the first choice pays forty-five shillings per pound, the others thirty shillings. But as there is no addition made to the first quantity in the market during the course of the year, the residual portions are examined over and over again, until they are exhausted.

Thus much for the black lead. The wooden case or exterior of black-lead pencils is usually made of cedar. Of cedar-trees there are many varieties, but the red cedar used for pencils is the Virginian cedar, (*Juniperus Virginiana,*) of North America.

To prepare the cedar for the pencils, it is cut by a circular saw into four-sided strips of a proper length, and are so arranged as to thickness that two of them together form a square of which one piece is thicker than the other, so as to admit the groove cut to receive the lead, to be confined to one piece only—this groove being made by a common plough plane.

The lumps of plumbago are cut into slices about the thickness of a shilling, by a thin circular saw; the slices being of various sizes, from one to two inches long, and varying in breadth.

In preparing the cylindrical leads for the "patent" pencil cases, for which Mr. Mordan took out a patent, the plumbago slices are cut into square prisms a little larger than are ultimately required; and these prisms are brought to the desired cylindrical form by a gradual process of change, produced by an ingenious contrivance. A series of three different sized circular holes are cut in pieces of ruby; the first of which is of such a size as to convert the square prism of black lead into an eight-sided prism, by cutting off the sharp edge: this eight-sided prism is then converted into one of sixteen sides, by thrusting it through the next smaller hole: and lastly, the cylindrical form is given by the third hole which is just the size required. The manner of thrusting out the lead in a "Mordan's" pencil-case with a little pin inside, will give a good idea of the action of the wire and tube in the above process.

The rubies are worn out in three or four days. Steel does not last above as many hours. So that the ever-pointed pencils are necessarily costly, six of them being sold for 2*s.* 6*d.* If they are cheaper than this we may be sure that they are adulterated. In Paris, when you buy a sheet of paper in a stationer's shop, some of these pencils are added to the purchase. Now these are formed of a mixture of plumbago, fuller's earth, and vermicelli.

There is no patent which has been more infringed on than that of Mordan's, for ever-pointed pencils. Birmingham is the source of this infringement, where they are sold as low as three farthings each, formed of composition. A thousand persons are now engaged in the manufacture of these pencils and cases.

To return to the cedar pencils:—One edge of a slice of plumbago being made straight and even, it is dipped in glue, and inserted into the groove cut in the thicker half of the cedar stick. With a sharp tool a cut is made on each surface of the slice, close to the wood, and the piece can then be broken off, leaving a little prism of lead in the groove. The straight edge of the slice is again dipped in glue, and inserted at the end of the first piece, and again cut off, till the whole length of the groove is filled. The surface of the wood is then smoothed down level, and the other half is glued on, thus making a square black-lead pencil.

The square pencil is brought into the cylindrical form by passing it through a hole in an iron or steel puppet of the exact size of the pencil, and forced along by the workman. On the other side of this puppet is a revolving apparatus, which cuts the pencil round; it consists of two guages and a small plane iron, revolving round an open centre. Beyond this is a cylindrical hole in a steel plate; as soon, therefore, as the first edge of the pencil is cut round, it is forced into this circular hole, and before the workman has lost the means of pushing it forward at the end that is square, the cylindrical end is pushed through the circular hole, so as to enable him to seize it with a pair of wooden nippers. It is thus pushed and drawn entirely through, and comes out cylindrical and polished, for the hole being a little smaller than the pencil, the latter is compressed in the act of passing through.

The pencils usually hawked about the streets of London are made with the powder of black lead, mixed with melted sulphur, and then poured into moulds, which are frequently reeds or rushes. Common carpenter's pencils are formed in this way, and answer well enough for the purposes to which they are applied. This mode, however, relates to those common pencils in which the lead (so called) is unusually thick; but the most successful attempt at deception is where the pencil has all the outward form and semblance of being well made, but where a process of anatomization shows the purchaser that the amount of black lead is marvellously small,—the central part of the groove being filled with a different substance. In common pencils, gum-arabic and resin are often mixed with the plumbago.

Genuine cedar pencils must cost at least sixpence each. Pencils of a spurious kind are, however, sold as low as 4½*d.* per dozen. The melting or softening of the lead when held in a candle, or applied to a red-hot iron, and yielding a blueish flame with a strong smell like that of burning sulphur, will at once detect the nature of their composition. Pencils so made are of a very bad kind; they are hard, brittle, and do not cut or make a mark freely, either on paper or on wood, rather cutting or scratching them than leaving a coloured stroke.

Drawing pencils are distinguished by the hardness or softness of the selected specimens of plumbago from which they are manufactured, and, accordingly, those made from the hard mineral, have H or H H stamped upon the cedar, and those of a soft or very soft nature are distinguished by B or B B, technically, however, B and double B, as in the former case H and double H.

Black-lead pencils appear to have been known for nearly two centuries, for a writer of about 200 years ago, says,—"Of late black lead is curiously formed into cases of deal or cedar, and so sold as dry pencils something more useful than pen and ink."

NOTES ON FOREST TREES. No. XXII.

The Great-Flowered Magnolia
(*Magnolia grandiflora.*)

The different species of Magnolia form the most beautiful objects in the scenery of a North American forest: in their native country they well deserve the name of forest-trees, but in Europe they seldom attain a sufficient size to entitle them to any other appellation than that of shrubs.

The *Magnolia grandiflora*, the big laurel, or tulip-tree of the French Canadians,—but this last name is more generally applied to another tree, (*Lyriodendrum tulipifera*,)—is one of the most distinguished of its tribe. Of all the trees of North America, east of the Mississippi, the big laurel is the most remarkable for the majesty of its form, the magnificence of its foliage, and the beauty of its flowers. It claims a place among the largest trees of the United States, and sometimes, though rarely, reaches ninety feet in height, and two or three feet in diameter, but its ordinary stature is from sixty to seventy feet. Its trunk is commonly straight, and the summit is nearly in the shape of a regular pyramid. Its leaves are like those of a laurel, but much larger, being from seven to eight inches in length; they are glossy, evergreen, and of a leathery substance. The flowers are white, of an agreeable odour, and seven or eight inches in diameter; they are larger than those of any other tree with which we are acquainted, and on detached trees are commonly very numerous. Blooming in the midst of rich foliage, they produce so fine an effect, that those who have seen the tree in its native soil agree in considering it as one of the most beautiful productions of the vegetable kingdom.

The fruit is a fleshy, oval cone, about four inches in length; it is composed of a great number of cells, which, at the age of maturity, open longitudinally, showing two or three seeds of a vivid red colour. The seeds soon after quit the cells, and for some days remain suspended from the cone, each attached to the bottom of its cell by a white filament.

The wood of the Magnolia is white and soft, but much inclined to warp, especially if exposed to the weather; on this account it is only used in the interior of buildings. The beauty of this tree has caused its introduction into the shrubberies and parks of Europe, but it is rarely able to endure the severity of our winters, in the open air, further north than the south of England; and, as we have already observed, its appearance will never bear a comparison with its kindred in the American forests.

The beautiful genus contains many ornamental trees and shrubs which have been partially naturalized in the gardens of the milder parts of Europe, where they produce a pleasing effect by the elegance of their form, the shape and magnitude of their leaves, the sweet scent of their large and splendid flowers, and the brilliant colours with which some of them are decorated; the wood itself is partially aromatic. The leaves, in some species, remain on during the whole year; in others they are shed at the beginning of the winter. The name of Magnolia was given to these trees by Linnæus, in honour of a celebrated French botanist, named Peter Magnol, who flourished in the seventeenth century.

The Magnolia can be propagated by seeds, placed in a hot-bed under a frame; but as the seeds seldom reach maturity in our climate, the most usual method of producing new plants is by means of layers, which are prepared by covering the lower branches with earth. These trees succeed best in clayey ground, mixed with a little black mould.

THE ADVANTAGES OF A BOOK.

Of all the amusements which can possibly be imagined for a hard-working man, after his daily toil, or in its intervals, there is nothing like reading an entertaining book, supposing him to have a taste for it, and supposing him to have the book to read. It calls for no bodily exertion, of which he has had enough or too much. It relieves his home of its dulness and sameness, which, in nine cases out of ten, is what drives him out to the alehouse, to his own ruin and his family's. It transports him into a livelier, and gayer, and more diversified and interesting scene, and while he enjoys himself there he may forget the evils of the present moment, fully as much as if he were ever so drunk, with the great advantage of finding himself the next day with his money in his pocket, or at least laid out in real necessaries and comforts for himself and his family,—and without a headache. Nay, it accompanies him to his next day's work, and if the book he has been reading be anything above the very idlest and lightest, gives him something to think of besides the mere mechanical drudgery of his every-day occupation,—something he can enjoy while absent, and look forward with pleasure to return to.

But supposing him to have been fortunate in the choice of his book, and to have alighted upon one really good and of a good class. What a source of domestic enjoyment is laid open! What a bond of family union! He may read it aloud, or make his wife read it, or his eldest boy or girl, or pass it round from hand to hand. All have the benefit of it—all contribute to the gratification of the rest, and a feeling of common interest and pleasure is excited. Nothing unites people like companionship in intellectual enjoyment. It does more, it gives them mutual respect, and to each among them self-respect—that corner-stone of all virtue. It furnishes to each the master-key by which he may avail himself of his privilege as an intellectual being, to

> Enter the sacred temple of his breast,
> And gaze and wander there a ravished guest
> Wander through all the glories of his mind,
> Gaze upon all the treasures he shall find.

And while thus leading him to look within his own bosom for the ultimate sources of his happiness, warns him at the same time to be cautious how he defiles and desecrates that inward and most glorious of temples.—Sir John Herschel.

The books of nature and of revelation equally elevate our conceptions and invite our piety: they mutually illustrate each other: they have an equal claim on our regard, for they are both written by the finger of one, eternal, incomprehensible God.—Watson.

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ON WIGS AND HEAD-DRESSES.

1 Ancient Egyptian Ladies Wig.

2 Roman Lady.

3 Queen of Henry IV. of France

4 Queen of Chas. I. of England.

5 Queen of Henry IV. of France.

6 Perruque a deux Queues.

7 Perruque Naissante.

8 Perruque a la Brigadiere.

9 Perruque a l'Abbe.

10 Perruque en Bonnet.

11 Perruque a Nœuds

ON WIGS AND HEAD-DRESSES.

No. I.

The custom of wearing false hair is of much more ancient date than is usually imagined; several of the nations of antiquity, when their riches and luxury were at the highest, were in the habit of adorning their persons by the addition of artificial tresses. It is likely that the ancient Babylonians employed the assistance of art in the arrangement of their hair, and perhaps wigs were not unknown to the fashionables of that day. That the art of wig-making had made considerable progress among the ancient Egyptians we are led to infer from the accounts of ancient historians, and the remains of Egyptian art which have been from time to time discovered; but the matter is now beyond all doubt, a perfect wig, which once belonged to an Egyptian lady, perhaps three thousand years ago, having been found in a tomb in the small temple of Isis at Thebes, in Egypt. This curious relic of antiquity, of which we give an engraving (No. 1,) is now to be seen among the remains of Egyptian art in the British Museum; its workmanship is excellent, and would not disgrace a modern *pérruquier*. The crown of the wig, as low as the ears, is entirely covered with small curls, while those portions which fall down over the shoulders are formed of a great number of small plaits of hair, each resembling the thong of a child's whip; the colour is nearly black, but it has a tinge of brown, which, perhaps, may be attributed to age.

Long hair appears to have been highly prized in the times we are alluding to, by the Jews in particular; but the habit of shaving the head, and supplying its place by artificial means, was one of the Egyptian customs, which they did not adopt during their bondage; on the contrary, they held it in utter contempt.

The Greeks and Romans, the latter people in particular, resorted to the use of artificial hair, although they did not exactly wear wigs. No. 2 represents the head-gear of a Roman lady; the men in general wore their hair short. The Roman ladies, says Strutt, not only anointed their hair, and used rich perfumes, but sometimes they painted it; they also made it appear of a bright yellow colour, by the assistance of washes and compositions made for the purpose, but they never used powder, which is a much later invention. They frizzled and curled the hair with hot irons, and sometimes they raised it to a great height by rows of curls, one above the other, into the form of a helmet; and such as had not sufficient hair of their own, used false hair to complete the lofty pile, and these curls appear to have been fastened with hair-pins.

Persons of rank had slaves to perform for them the offices of the toilet; they held the mirror (*speculum*,) in their hands themselves, to give directions; and Martial tells us, that if the slave unfortunately misplaced a hair-pin, or omitted to twist the curls exactly as they were ordered, the mirror was thrown at the offender's head, or, according to Juvenal, the whip was applied with much severity. It appears, indeed, that a number of women attended on these occasions, for no other purpose than to direct the operation. The married women used a kind of bodkin, which they managed very dexterously, to adjust and divide their hair into two portions, one turning to the right and the other to the left, and by this line of separation the married ladies were distinguished from those who were unmarried. The hair was adorned with ornaments of gold, with pearls, and with precious stones, and sometimes with garlands or chaplets of flowers; it was also bound with fillets and ribands of various colours. The ribands appropriated to the head-dresses of virgins differed from those of the married women.

With the decline of the Roman empire the practice of employing artificial hair fell into disuse, and we hear no more on the subject until about the year 1600; at which time it became the fashion in France to supply the deficiencies of a natural head of hair by artificial tresses, which were sewn on to thin sheep-skin, pared down to the pelt; then thin silk was used for the same purpose; and at last a complete peruke was formed. The word wig is evidently to be derived from the French name *pérruque*, which in some old dictionaries is spelt *perwicke*, thence *periwig* and *wig*. The peruke was, in the first instance, intended to supply a natural deficiency of hair; but, in the end, this article of dress became so necessary to all who aspired to the name of fashionable, that the most beautiful head of hair was frequently sacrificed for the purpose of covering the head with a peruke.

The court of Louis the Fourteenth of France was looked up to, as the "glass of fashion," by the rest of Europe, and this affair of perukes was considered of so much moment, that the king licensed forty-eight *barbiers-pérruquiers* to make this important article for the court, and, at the same time, two hundred others to serve the commonalty. The business increased to such an extent, that the Minister of Finance became alarmed at the quantity of money which left the kingdom to purchase hair in foreign countries, and it was gravely deliberated, whether wigs should not be abolished by law, and caps established in their place; but the pérruquiers having proved, by statistical details, that the export of manufactured perukes produced a greater profit to the nation than the purchase of hair did loss, the wigs gained the day, and the manufacture increased so rapidly, that the number of licenses were increased to eight hundred and fifty, and the members were known under the title of *barbiers-pérruquiers-baigneurs-etuvistes*. They received letters patent, and their officers were hereditary; these consisted of a provost, wardens, and syndics. To this body of men, so essential to the members of fashionable life, the king gave the sole right of dealing in hair, either by wholesale or retail, of making and selling powder and pomatum, preparations to remove the hair, drops for the cure of the toothache, in fact, every application which was intended for the benefit of the head and face. The only parties who interfered with their exclusive privileges were the surgeons; to these men the newly-constituted company could not deny the use of the razor in shaving, for it was a surgical instrument, but to prevent their intermeddling with the art of hair-cutting, it was decided that the insignia of their callings should be different. The surgeon was to hang up for his sign a *copper* basin, and could only paint the front of his house either red or black; on the other hand, the pérruquier was to exhibit a basin of white metal, and could paint the front of his shop of any colour he chose, except red or black. The use of powder was not at first allowed, as the monarch had an antipathy to it, but at length he yielded to the wishes of his courtiers, and permitted a trifling quantity to be sprinkled even over his own perukes.

The expense of perukes in these days was so enormous, that some of the fraternity commenced dealing in second-hand articles, which they manufactured to look like new, and were able to sell at a reduced price. "It is true they were not very durable, but as

they resembled new articles, they were of great service to individuals whose fortunes were small." But to prevent abuse in selling second-hand wigs for new, the dealers were prohibited from establishing themselves in any other part of Paris except the *Quai de l'Horloge du Palais.*

Nos. 3 and 5 are from portraits of the queen of Henry the Fourth of France, and No. 4 from a head of the queen of Charles the First of England. During this period, and until the beginning of the eighteenth century, the men wore amazingly long heads of hair, spreading over the head and shoulders; but at this time hair-powder was used. Towards the close of the century, perukes of the strangest form came into fashion. To illustrate the subject we have selected six examples from French engravings, namely:—

No. 6, *la pérruque à deux queues*, is evidently intended for a man of fashion; No. 7, *la pérruque naissante*, half wig and half natural in its appearance, we may suppose worn by a young man; No. 8, *la pérruque à la brigadière*, was only worn by military men; No. 9, *la pérruque de l'abbé*, was worn by the lay clergy of France, who mixed more with society than the priests themselves; No. 10, *la pérruque à bonnet*, intended more for comfort than show; No. 11, *la pérruque à nœuds*, would become an elderly gentleman, but is more assuming than the last.

COINCIDENCES RESPECTING THE HARMONY OF INHARMONIOUS SOUNDS.

..... some perchance,
Rude singly, yet with sweeter notes combined
In unison harmonious.—GISBORNE.

But cawing rooks, and kites that swim sublime
In still repeated circles, screaming loud,
The jay, the pie, and e'en the boding owl
That hails the rising moon, have charms for me.
Sounds inharmonious in themselves and harsh,
Yet heard in scenes where peace for ever reigns,
And only then, please highly for their sakes.—COWPER.

..... The jay, the rook, the daw,
And each harsh pipe, discordant heard alone,
Aid the full chorus.—THOMSON.

The screams of the jay and the woodpecker, however discordant in themselves, or when out of place, accord admirably with the forest.—WHITE *of Selborne.*

Sounds do not always give us pleasure according to their sweetness and melody; nor do harsh sounds always displease. We are more apt to be captivated or disgusted with the associations which they promote, than with the notes themselves. Thus the shrilling of the *field-cricket*, though sharp and stridulous, yet marvellously delights some hearers, filling their minds with a train of Summer ideas of everything that is rural, verdurous, and joyous.—*The same.*

THE FOOT OF A HORSE is one of the most ingenious and unexpected pieces of mechanism in the animal structure, and scarcely yielding to any in regularity, and in complexity of parts, under simplicity of design. The hoof contains a series of vertical and thin laminæ of horn, so numerous as to amount to about five hundred, and forming a complete lining to it. Into this are fitted as many laminæ belonging to the coffin bone; while both sets are elastic and adherent. The edge of a quire of paper, inserted, leaf by leaf, into another, will convey a sufficient idea of this arrangement. Thus the weight of the animal is supported by as many elastic springs as there are laminæ in all the feet, amounting to about four thousand; distributed in the most secure manner, since every spring is acted on in an oblique direction. Such is the contrivance for the safety of an animal destined to carry greater weights than that of its own body, and to carry those also under the hazard of heavy shocks.—MACCULLOCH.

THE THERMOMETER-STOVE.

A BOOK has lately been published by Dr. Arnott, *On Warming and Ventilating*, the principal design of which is to communicate to the public instructions for making and using what is called by the inventor *A Thermometer-stove.* This stove possesses many valuable properties, and will, unquestionably, be the means of effecting some extraordinary changes in the domestic habits of the people of this country. As it stands associated with one of the most ordinary, but at the same time important, operations on which individual and social health and comfort depend, we present to our readers the following particulars.

Dr. Arnott is well known as an eminent physician, a popular writer, and a practical philanthropist. He has already gained the thanks of the medical profession by permitting the unrestricted use of his *water-bed*, and in the present instance is equally entitled to the respect and gratitude of all classes. The Thermometer-stove is equally adapted for the cottage and the mansion, and with a liberality which does him honour, its inventor has given to the public the full benefit of his labours.

Before we describe Dr. Arnott's stove, let us offer a few brief observations on the two modes of heating, which, for domestic purposes, are those generally adopted in our own country. And first of all, we refer to the *open fire-place*, in which peat, wood, or coal, are used as fuel.

For the sake of more simple illustration, we limit our remarks to an open coal fire; the kindling of which is a somewhat tedious and wasteful process. But let us suppose the fire to be perfectly alight and burning briskly. It surely cannot escape observation that a valuable portion of the fuel is passing away unconsumed, namely, that which ascends the chimney in the form of smoke. At certain intervals, the fire of which we speak requires poking, trimming, and refreshing, by additional supplies of fuel. If it happen that we have a good fire, when fresh fuel is laid on, the waste will bear some proportion to the quantity of ignited fuel already in the grate as compared with the fresh supply. Sometimes the latter will be speedily vaporized, as when we have a blazing fire; at other times waste will occur by coal falling through the grate before it is properly ignited; whilst it not unfrequently happens, that by fuel injudiciously applied, either as respects the mode or the quantity, a good fire is suddenly converted into a dull one, which, unless carefully tended, will soon be extinguished.

On a moderate calculation, it is estimated that, from the causes just mentioned, one-fifth part of all the coal used for domestic purposes is lost to the consumer. And this is unavoidable even with careful management. Where cinders and small coal are thrown on the ash-heap, the proportion is, of course, much greater.

But the waste of *fuel* is a trifling consideration in comparison with that of *heat.* The abundant supply of coal with which in this country we are favoured, and its consequent cheapness, is one of the principal causes of the long-continued use of an open fire. Far be it from us to undervalue the comforts of an English fire-side, or to appear insensible to the many delightful associations connected with it. The existence of these we admit, as we do also their influence upon the national character. But dismissing our prejudices on this subject, we believe it will be found that the advantages of an open fire are not so great as we imagine, and that even its comforts are pretty equally balanced by its inconveniences. Hence we cannot but venture the opinion, that, by and by, we

(or at any rate our successors) shall become equally attached to more rational and more economical modes of warming as we are now to those in common use.

We have said that the waste of *heat* by an open fire greatly exceeds that of fuel. In an ordinary fire-place, whatever be its form, the quantity of air which passes by, or over, the fire is much greater than that which passes through it. We need hardly remark that the combustion of the fuel depends on an uninterrupted supply of air, and the more rapidly the air circulates amongst the ignited fuel, the greater is the quantity of heat liberated in a given time.

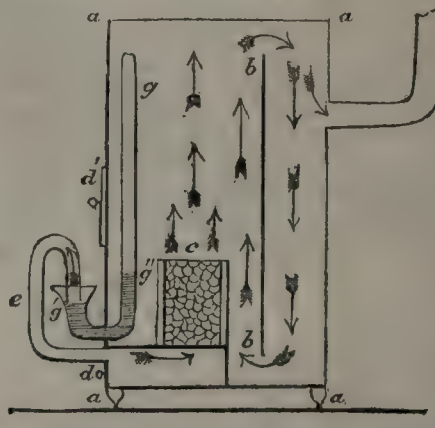
A condition essential to the operation of an open fire is, that it be placed almost immediately under a flue communicating with a chimney, which flue must, in some respects, correspond with the size of the fire-place. To insure sufficient draught in the flue to make the fire burn, and to carry off the smoke, a current of hot air must be constantly ascending it. Any defect in this part of the process occasions what is very justly considered a nuisance, namely, a smoky apartment. To the situation of the fire, and the quantity of air permitted to pass over it, may be attributed the loss of heat of which we complain. Under the circumstances just described, the heat which enters the room is only what is radiated from the front of the fire. By its means the air immediately surrounding the fire has its temperature raised, but the moment the door of the apartment is opened, the air thus warmed is propelled into the chimney, and several minutes must elapse before the air which gained admittance will be warmed to the same temperature as that which was so suddenly driven out. Hence it is, that however comfortably an apartment may be fitted up, if it be warmed by an open fire, the temperature of the air within it is partial and unequal. We naturally turn towards the fire for warmth; but who can deny that the nearer they approach the fire the more difficult is it to keep warm that part of the body which is turned away from it?

In the best constructed houses, the crevices in floors and around doors and windows permit the entrance of more air than, under ordinary circumstances, is sufficient for all the purposes of warming and ventilating. The quantity of air required for the combustion of fuel, when that fuel is economically employed, is almost inconceivably small. But in an open fire-place, in proportion that the fire is enlarged, so much the more rapid will be the motion of the hot air in the chimney; a process which necessarily implies the access of an equal quantity of cold air to the room. Thus we may often notice when there is a large fire in a room, the air will make a *whistling* sound in passing through a key-hole; but the sound ceases when the intensity of the fire has abated. It can be satisfactorily proved, that by an open fire, at least three-fourths, and in many cases, seven-eighths, of the heat produced from a given quantity of fuel are absolutely wasted by being permitted to ascend the chimney.

Another mode of heating, and which is adopted very generally in entrance-halls, shops, offices, and public buildings, is by means of the *hot-air stove*, which consists of an enclosed fire-place surrounded at the back and sides by an iron case, between which and the fire-place air is permitted to circulate, and consequently becomes heated. By this stove less heat is wasted than in an ordinary fire-place, but there are several objections to its use, of which we mention the following.

The hot-air stove requires a good deal of attention: almost as much as an open fire. It is liable to be heated red-hot; the salubrity of the air which comes in contact with it being thereby impaired, whilst an odour peculiarly disagreeable is diffused throughout the apartment in which it is placed. There is danger attending the use of this stove, unless the pipes by which it communicates with a chimney or the external air are fixed at a proper distance from wood and other inflammable materials. To the neglect of this necessary precaution, in conjunction with carelessly over-heating stoves of this kind, we may attribute some of the most extensive fires of recent occurrence.

The stove invented by Dr. Arnott differs essentially from the common hot-air stove, and still more from an open fire-place. But let us describe it; and in doing that we shall find that the following sketch will materially assist us. It represents the stove with one of its sides removed, so as to exhibit its interior arrangements.



The outlines of the figure, *a a a a*, represent the case or body of the stove, which might be formed either of cast or sheet iron. It is divided into two chambers by the partition, *b b*; but in such a way that there may be a free communication at the top and bottom. *c* is a small furnace, or, as it is called by the inventor, a fire-box, made of iron, and lined with fire-bricks. The fire-box is not in contact with the exterior case of the stove. It communicates at the bottom with an ash-pit, the door of which is at *d*, —that of the stove, by which the fuel is introduced, is at *d'*. Both these doors must fit very accurately. Above the door of the ash-pit is a bent pipe *e*, by which air gains admittance to the fire.

A fire being kindled and the doors at *d d'* shut, the only way in which air has access to the fuel is by the pipe *e*; the air so admitted, passing through the fire before it enters the upper part of the stove. That portion of the air not required to aid the combustion of the fuel having reached the main body of the stove, and there mixing with the smoke and other products, they circulate slowly in the directions indicated by the arrows, and at length pass into the chimney by the pipe *f*.

The slow movement just mentioned as taking place within the stove may well be contrasted with what happens in an open fire-place. In one case the greater part of the heat produced is rapidly carried off by a current of air ascending the chimney—by the Thermometer-stove it is detained until almost the whole of it has been diffused throughout the apartment.

The bent tube *g* terminating in a cup-shaped opening at *g'*, is a self-regulating valve. The tube is closed at the end *g* within the stove. *g' g''* represents mercury which occupies the bend of the tube. When the fire in the stove burns too briskly, the air in the tube occupying the space between *g* and *g''* is ex-

panded, and by expelling some of the mercury from the tube at g'' into the cup at g', it closes the aperture of the pipe e; thus cutting off the supply of air to the fire. In a few minutes (the fire in the mean time having abated its energy,) the air in the tube will return to its former dimensions, and the mercury subsiding in the cup, air is again permitted to enter the ash-pit.

The stove, of which we have thus attempted to convey a general idea, may be made of any required form or size. Instead of the self-regulating air valve just described, it is fitted up with others of a very simple construction, and which admit of being adjusted with the greatest accuracy by the hand.

We have seen Thermometer-stoves of various forms, some of them very beautifully designed, in operation. We have attentively watched the process going on within them, and have made ourselves acquainted with their capabilities as heating agents. The result of our observations leads to this conclusion; that if the Thermometer-stove be made in strict conformity with the plain and simple rules which are so perspicuously laid down by Dr. Arnott, it will prove one of the most economical as well as most useful inventions of this rapidly improving age.

Among the advantages of the Thermometer-stove, we may mention that it maintains an uniform temperature if required at night as well as by day, but which can be increased or diminished in a few minutes. The fire within it may be kept alight without requiring attendance or any additional fuel for ten, or even a greater number of, successive hours. To warm a moderate-sized room, the cost of fuel will not exceed a penny a day. No smoke, dust, vapour, or other products of combustion, can possibly escape into the room. The air is warmed, not heated, and hence it is not deprived of its health-preserving properties. There is no danger attending the use of the Thermometer-stove; it is more easily managed than an open fire; and there is no waste either of fuel or of heat.

He who can imagine the universe fortuitous or self-created, is not a subject for argument, provided he has the power of thinking, or even the faculty of seeing. He who sees no design, cannot claim the character of a philosopher: for philosophy traces means and ends. He who traces no causes, must not assume to be a metaphysician; and if he does trace them, he must arrive at a First Cause. And he who perceives no final causes, is equally deficient in metaphysics and in natural philosophy; since, without this, he cannot generalize,—can discover no plan, where there is no purpose. But if he who can see a Creation, without seeing a Creator, has made small advances in knowledge, so he who can philosophize on it, and not feel the eternal presence of its Great Author, is little to be envied, even as a mere philosopher; since he deprives the universe of all its grandeur, and himself of the pleasures springing from those exalted views which soar beyond the details of tangible forms and common events. And if, with that presence around him, he can be evil, he is an object of compassion, for he will be rejected by Him whom he opposes or rejects. —Macculloch.

Compassion.—Compassion is an emotion of which we ought never to be ashamed. Graceful, particularly in youth, is the tear of sympathy, and the heart that melts at the tale of woe; we should not permit ease and indulgence to contract our affections, and wrap us up in a selfish enjoyment. But we should accustom ourselves to think of the distresses of human life, of the solitary cottage, the dying parent, and the weeping orphan. Nor ought we ever to sport with pain and distress, in any of our amusements, or treat even the meanest insect with wanton cruelty.—Dr. Blair.

Honour.—He is worthy of honour, who willeth the good of every man; and he is much unworthy thereof, who seeketh his own profit, and oppresseth others.—Cicero.

ON EMPLOYMENTS WHICH INJURE THE EYE-SIGHT.

No. II.

FUNCTIONS OF THE EYE—ABUSE OF THE ORGANS OF THE SENSES—CAUSES BY WHICH THE EYE-SIGHT IS IMPAIRED.

Having already described the chief parts and functions of the eye, and its appendages, we come now to consider how it is that this apparently elaborate apparatus performs its office. A pencil of light, that is, a bundle, or collection, of rays proceeding from any luminous object, falling upon the cornea, enters it, and is refracted or bent in its passage through the aqueous humour, by which means the rays of the pencil are brought nearer to parallelism; such of the rays as can pass through the pupil are further refracted by the crystalline lens, and the rays are now no longer divergent, that is, they do not spread out *from* a point, but begin, in passing through this lens, to converge or proceed *to* a point, and this convergency is perfected by means of the vitreous humour, which brings the converging rays to a point exactly when they reach the retina. This process is undergone by every pencil of rays proceeding from any object to which the eye is directed, and an exact image of such object is depicted on the retina. If this convergent point do not quite fall upon the retina, but before it, in the vitreous humour, the eye is said to be short-sighted; if, on the contrary, these convergent points fall beyond the retina, the eye is then long-sighted; but these and other defects to which the eye is subject, will be discussed at greater length hereafter.

What we have above stated is the grand and important element in distinct vision; the convergence of the rays of a pencil to a point on the retina. An admirable adjustment of parts and of degrees of refractive power in the different humours of the eye produce this perfect convergency, and the mind can sufficiently appreciate and understand the mechanism and purposes of all this exquisite arrangement,—but here we have attained the utmost limit of our knowledge,—we have traced upon the retina a picture of the forms presented to the eye,—we see that this retina is an expansion of a nerve called the optic nerve, which proceeds from the retina into the brain, the seat of the mind;—but how the mind receives its impressions of light through the medium of this optic nerve, is a question that has never been answered, and probably never will be answered. The student in science is constantly presented with certain barriers beyond which he may not pass,—with certain limits to the inquiring powers of his mind, when subjects such as these are presented to him, which admit neither of demonstration or of analogical inference, and are therefore beyond the purposes of physical inquiry. Let him not, therefore, deal in vague conjectures, which, however ingenious, must still be unprofitable; but rather let him turn to the immense field which has already been cultivated so successfully, and from whence rich harvests of knowledge have been gathered. We cannot join in the utterance of the querulous opinion, which, because there is much that is unknown, denies the existence of any knowledge at all; nor could we ever assent to the conclusion of the philosopher, who said that his long life of study had taught him that he knew nothing; on the contrary, we can assure the reader, that the arena of modern science is so extensive, that a very long life and untiring industry, would be inadequate to a fair investigation of its contents.

The reader will now have some idea of the me-

chanical structure of the eye, and how, as far as we know, this structure assists the powers of vision. We come, therefore, to the more direct purpose of our subject, namely, the consideration of those employments of the eye by which its powers are impaired or destroyed. And here we must remind the reader of another law of nature as remarkable and beautiful as any one in her code, if we may be allowed such an expression, where all appear alike beautiful and remarkable when we are quite sure that we read and interpret them correctly; it is this—that the perfect action of all the faculties, whether mental or physical, can be assured and perpetuated only by allowing them certain periodical intervals of perfect repose. Now this may appear to be a truism, so perfectly well known, that the necessity for its enunciation in this place may be questioned by some: but we must remind our readers, that a principle is as important in its nature as it is unbounded in its application; that it is the business of science not only to discover principles, but to trace them to effects where their presence is, perhaps, in no way suspected; that we often recognise the action of a principle in a few effects to which we are most obviously exposed, but we are often slow to recognise the same principle in effects which afford us a larger amount of pleasure or profit on the one hand than of pain on the other, which minister to our cupidity, our pride, our vanity; or which flatter one of those "sins which do most easily beset us;" and, indeed, we are frequently unable, from ignorance of the extent of a principle, to apply it as a cause to effects, which we often think have no cause at all, or at least a very remote one, which, if discovered, we pronounce to be irremediable. But this sort of argument is unjust and unreasonable: in nature there are only a few principles or first causes; some of these we are cognizant of—to all of them we are subject: our business, therefore, is to study the code of laws by which we are governed, to conform with the strictest obedience, since rebellion meets with certain punishment, which, if ever it can be removed, is removed only by a return to obedience.

The senses, then, require perfect repose in order to their perfect action, and this repose implies a removal of every cause which excites them to action. By the perfect action of an organ, we mean its legitimate use and employment; the snuff-taker abuses his organ of smell, and its functions are manifestly impaired. The manufacturer of perfumes is a bad judge of odour from the same cause. A nauseous smell ceases to be nauseous unless it is judged of at intervals. The sense of hearing is subject to loss of power from abuse of its functions: a man accustomed to the din of noisy factories, and who sits down undisturbed by and even unconscious of the presence of that disturbance, which to a stranger is, at first, insufferable, is scarcely conscious of delicate sonorous impulses. Blacksmiths hear soft tones with difficulty, and examples have been abundant of old artillerymen who have become quite deaf from the long practice of their profession. The sense of touch is less perfect in the ploughman than in the watchmaker, and most perfect, perhaps, in the blind man, who by its means supplies in a great measure the loss of sight.

Taste also may be abused: the excited reveller scarce distinguishes the flavour of his "liquid fire," as the banquet approaches its end, and the pampered epicure is gratified only by allowing to his palate intervals of repose. The eye exhibits this principle in a beautiful manner. In its healthy state its function is being constantly intermitted in the process of winking, as also by moving it about towards different objects: if the eye be kept open and rigidly fixed upon one object, its visual power rapidly declines.

There is so much sympathy between various physiological structures, that it often happens that a morbid or diseased action of one structure will seriously interfere with the functions of other structures which are healthy. In the healthy eye, the retina, the crystalline lens, the ciliary nerves, and the pupil, must harmonize in their action: the many diseased affections of the organ which include weakness or indistinctness of vision, result from a weak state of the retina, from the disordered action of the iris and ciliary apparatus; this is brought about mainly by inflammation of the eye or its appendages, resulting from injudicious use of the organs.

To discuss all the diseases of the eye resulting from abuses of its function, is manifestly a subject for a large medical volume, the study of which belongs to the medical pupil alone:—our purpose is more confined: we intend to point out some of the cases of every-day occurrence, wherein the organ is injured by an habitual irritable treatment. We do not intend to employ technical terms, except a few, which may be necessary to the comprehension of our subject, and still less do we pretend to direct remedies, except by pointing out causes of injury to the eye. In most cases our purpose will be effected, when, having clearly traced an ill effect to its cause, we say, remove or mitigate the cause, and the effect will probably cease.

In the pathology of the eye the term *amaurosis* is employed, in which is comprehended all those imperfections of vision resulting from a morbid action of the sentient apparatus belonging to this organ. The term amaurosis is derived from a Greek word signifying *to darken*, and implies partial or total loss of vision, according as the optic nerve, or retina, is partially or totally paralyzed. This injury, or paralysis, is not generally manifested by external symptoms, and is therefore clearly distinguished from cataract, opacity of the cornea, and closed pupil. This disease is due to a variety of causes which it is not our business to discuss; such as disorganization of the retina, vascular turgescence, injury of certain nerves, &c. Our purpose is, as we have already stated, to point out those common causes, of every-day occurrence, which the exercise of many arts and professions is calculated to induce, and these causes may be conveniently arranged into five heads, namely:—

1st. Sedentary employments in which the head is bent over work of various kinds; including those cases in which the eye is customarily employed on minute objects.

2nd. Where the eye is employed upon too strong or too little light: upon polished or reflecting surfaces.

3rd. The habitual exposure of the organ to high temperatures.

4th. The habitual exposure of the eye to acrid fumes.

5th. The customary employment of optical glasses.

By the light of Divine revelation, Christianity enables us accurately to discriminate between good and evil, right and wrong: it teaches us to see things according to their own nature and in their proper colours: to behold those qualities which are really vicious, deprived of the dazzling brightness, wherewith reason, impaired by passion, had invested them; and to contemplate those which are virtuous, disencumbered from the clouds of worldly prejudice, and arrayed in their native beauty. In a word, it teaches us to see things, as they are in the sight of God, and not as they appear according to the erroneous conception of men.—Bishop Mant.

ON THE PERPETUATION OF PLANTS.

The care which the Creator has bestowed on the perpetuation of plants offers a wide field of inquiry. The collateral as well as the direct means of propagation are very numerous, and the results very extensive and valuable.

The circumstance which is, perhaps, most striking in the mode of propagation by seeds, is the apparent anxiety for their production, in the means adopted. This is less sensible to common observation, where the magnitude, the duration, and the uses of the plant itself, are conspicuous; but it becomes striking in the smaller and more perishable ones, and is often very remarkable in the lowest parts of the scale. Thus in the oak, we pay little attention to the production of seeds; or if noting it, we still know that there is before us a being, destined to a life of so many centuries, that we scarcely think of its death, or of the necessity of a system of perpetuation.

It is in the biennial and the annual plants that this anxiety for the continuation of the races is most obvious to common observation. Millions of individuals seem to be utterly worthless: and there are even species without end, for which we can discover no use, though desirous to find at least an insect attached to each. Amid the hundreds of lichens and mosses, a very few would, as far as we can see, have fulfilled the purpose which they appear solely to serve, in producing soils on naked surfaces. Yet in these we trace the same care and the same anxiety. The annual seems to grow for no other purpose than to produce seeds; and that being accomplished, it dies. For this it struggles against every difficulty: and under every check, every accident, every mutilation, it still labours for this end, as if it were a conscious agent. We cut off its flowers, or cut down itself, obstruct, impede it, in every manner, but it still resists, proceeding with an obstinacy of determination to effect this great object; while if, tired of opposing it, we cease, it recommences, and having at length gained its purpose, dies. We can often even prolong the annual life for another year, or more, by the same opposition; as if it was determined not to part with existence till it had obeyed its orders and fulfilled its destiny.

The first mark of care, if a remote one, is found in the contrivances for protecting the future flower through the Winter, wherever such protection is necessary. In the buds, the beautiful packing, the investing scales, the down or hairs in some cases, and the varnish in others, are familiar: and, by these contrivances, aided by that vital power, the action of which in resisting cold has not been explained, the most complete protection is afforded. In the bulbous-rooted plants, the bud is not less effectually protected beneath the ground, partly by the depth of earth, and partly by the singular chemical properties of the coverings, aided by the same resisting vitality.

In other cases, the flower bud is not produced till the frosts are passed; and our attention may now be directed to the provisions within it for the formation and ripening of the seeds. In a certain sense, indeed, the flower is a superfluity, an example of gratuitous beauty, while it also contains provisions for the feeding of insects; yet with these are always combined some uses for the seed itself, as, in many cases, they are so numerous and remarkable that they cannot be overlooked. The reader need only be reminded of the various ways in which they protect the essential parts of the fructification, the stamina, and the pistils, on which the future seed depends; and of the contrivances for bringing the pollen into contact with the latter.

The essential protection which the calyx affords, by enveloping everything while yet in a tender state, must not be forgotten; apt as we are to look on it as a superfluous part, from attending only to the expanded flower. It would be endless to point out the numerous forms and modes under which it guards the unopened flower, and above all from the access of water. The calyx of the rose, so useless when expanded, is a familiar instance of protection afforded by a structure which, compared to the purpose, is very inartificial; and yet in this, and all similar forms, that protection is complete. In the cistus, possessing a flower of unusual tenderness and delicacy, a varnish is superadded, for the purpose of warding off the rains. The monophyllous calyces present a structure more apparently efficacious, yet the protection is not more complete. And if the scale calyces of the grasses offer a much simpler contrivance, the security which they afford is not the less perfect. The calyx of the poppy is lax, and not very firmly closed; but as a counterbalance to this, the flower bud is bent down by a curvature of the stem, and erects itself only when the protection of this deciduous guard is no longer wanted. The obstinacy with which this bud refuses to flower till it can erect itself, belongs to a still more interesting circumstance in the physiology of plants: but under the present view, the inverted position enables the back of the calyx to ward off that water which might have penetrated the less perfect junction at the summit.

That provision may here be pointed out in the liliaceous flowers, which, as a sheath, forms the substitute for the absent calyx, while the leaves also are sometimes arranged to perform the needful function. Under many different modes, the tulip, the genus Allium, the grasses, and far more, will afford examples of protection, given either to supply the want of a calyx, or to add to the security which that affords. And thus the seeds of the mosses are so embosomed in the plant, at first, as almost to elude the botanist; while they escape the chance of injury; to be elevated for dispersation, only when all hazard of failure is past.

It is under all this care and concealment, that the essential parts, destined to produce the perfect seed, are growing within; free from all hazard, till the expanding flower opens to the light that the work may be completed. And then do we begin to perceive the utility of many other preparations towards this great end, the purposes of which we might not have understood before, and which he who looks on this interesting part of creation with a common eye, never sees. The vanity of philosophy may smile, if it pleases, at what it may choose to term fanaticism, but it is he who seeks for the hand of the Creator in every one of His works, who has found the true clue of investigation; since the purpose is that clue, and, that to study the design and the Designer, are one. And if the care of a parent for its offspring, the anticipations, the preparations, the watchfulness of a mother, are objects of our admiration, shall we not at least investigate the contrivances, the thought, the anxiety, of the Great Parent of all, for the safety and the life of these, His beautiful, but His lowest children; not inquire of his care for their perpetuity, that not one shall be lost? Could more have been done; and if He has not done it, by whom then was it effected? Who is it that contrived, who is it that watches over the lilies of the field, that not one of them should perish from his land? Who is it that guards to maturity, even the minutest moss, and ensures it a posterity, that it shall not fail from the multitude

of His children, who, even in the vegetable world, look to Him for their food, their life, and their enjoyment? Was it He: and is it He who cares not for man, provides not for him, governs him not, watches him not? Be it so, if it can afford satisfaction to think that so it is: but it will not be so to him who will open his eyes on the world around him, and who has learned, in everything, to look to the Cause, the Parent, of the universe. Would that I could persuade him who has hitherto walked through creation without eyes, without thought, without a heart, to take into his hand the first flower that shall present itself, and examine it as the work of some Being at least who intended, and wrought, and cared. If eloquence has long done its worst for this unfortunate cause, there must be one who can sit down with the next flower that meets him in his Summer walk, and ask himself, Whence came this, why is it here, why all this beauty, why all this care? I have seen it rise from a minute seed, I trace a series of cares and contrivances that seed shall spring from it again, I trace these under a thousand forms, I marvel at their ingenuity and their wisdom, I am astonished at an anxiety which has neglected nothing, I see that an end was intended, and I find that end attained. What more does man ever do to attain his objects, when does he labour with more care and more knowledge, and when does he succeed with more certainty? Does woman show more anxiety, more contrivance, for her offspring, than the Parent of this little flower has displayed? And who can that careful, that affectionate parent be? No one! Even so was it no one that reared me from helplessness to maturity, I knew no parent's thought, no mother's care: there is no God. Can such a conclusion ever have entered the heart of man? We know not how to believe him who has declared it.

[*Abridged from* Macculloch's *Proofs and Illustrations of the Attributes of God.*]

THE CAMERA LUCIDA.

The Camera Lucida, an invention of Dr. Wollaston, like the Camera Obscura, is an instrument employed in making copies of drawings, and in portraying distant objects; but it is of greater service than the Camera Obscura, being much more portable, and, if properly used, reflecting the image of the object without the least distortion.

If a piece of thin glass is held at an angle of forty-five degrees with the horizon, at a small distance from the table, and a sheet of white paper is placed immediately beneath it, the reflected image of an object before it will be visible, by looking downwards upon it; and as the glass is transparent, the hand and pencil can also be seen, and an outline of the image can be made upon the paper. In this case the image is inverted. Such an instrument as this can be made off-hand very easily. Let B be a piece of thin plate-glass, about an inch and a quarter long, and three-quarters of an inch wide; A a piece of wood in which the glass is fixed, and C a piece of pasteboard with a small hole in it, forming an eye-piece to keep the eye directed to one point. Let this little instrument be fixed on the top of a small stand, and you have a Camera Lucida of the simplest construction, but possessing the disadvantage of reflecting an inverted image.

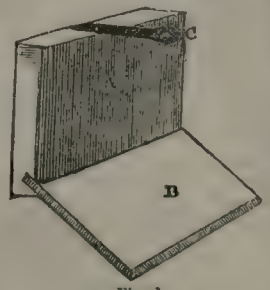


Fig. 1.

But the inversion can be corrected by taking a little more pains. Let A be a piece of looking-glass fixed in a wooden or brass frame, and connected with a piece of clear glass, B, so that the angle C B A shall be an angle of one hundred and thirty-five degrees, the image of an object placed at F will be reflected from the looking-glass at A, and proceed to the clear glass at B: from this it will be reflected upwards to the eye at G, and the glass being transparent, the image and the hand will be seen at the same time; in this case the image is erect. But, in general, neither of these plans are resorted to, for in both cases, as there are two reflecting surfaces from the glass, there will necessarily be two reflected images, one of them certainly much less vivid than the other, but still sufficiently visible to distract the eye

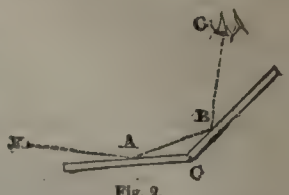


Fig. 2.

The optical portion of the Camera Lucida which is usually sold consists of a prism. Fig. 3 is a section of the prism employed; the angle A is equal to 22½ degrees, C to 135 degrees, D 22½ degrees, and B is a right angle of 90 degrees. The solid nature of the prism will not allow the hand to be seen through its thickness, and the instrument is used in a different manner to the last contrivance. A is the prism, B a moveable piece of brass, having a small eye-hole in it at B; the reflected ray from C is received near to this corner of the prism, and reflected upwards to the eye; the eye-hole is so adjusted that one-half only is over the prism, the other half leaves a free space through which the hand and pencil can be seen. In using the instrument a vast deal depends on the proper adjustment of this eye-hole.

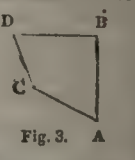


Fig. 3.

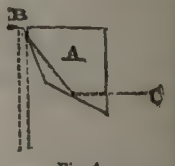


Fig. 4.

If the light is very powerful on the object, and much less so on the paper, the part of the prism exposed through the hole should be small, and the opening through which the paper is seen large in proportion. On the other hand, if the light on the drawing is weak, a larger part of the prism must be uncovered. In copying a print, great care must be taken that the print itself is perfectly flat and perpendicular to the horizon, and that the side of the prism at B A, fig. 3, which is opposite the print, shall be parallel to it. If this is not attended to, the print will be thrown into perspective and the copy be distorted.

If the object is to be copied of its natural size, its distance from the prism in front must be equal to the distance from the eye to the paper; if it is to be reduced it must be placed at a greater distance; if to be enlarged, it must be brought nearer.

The Camera Lucida has been fixed to the eye-hole of a telescope or a microscope, in such a manner as to allow the objects within the field of vision to be copied on paper.

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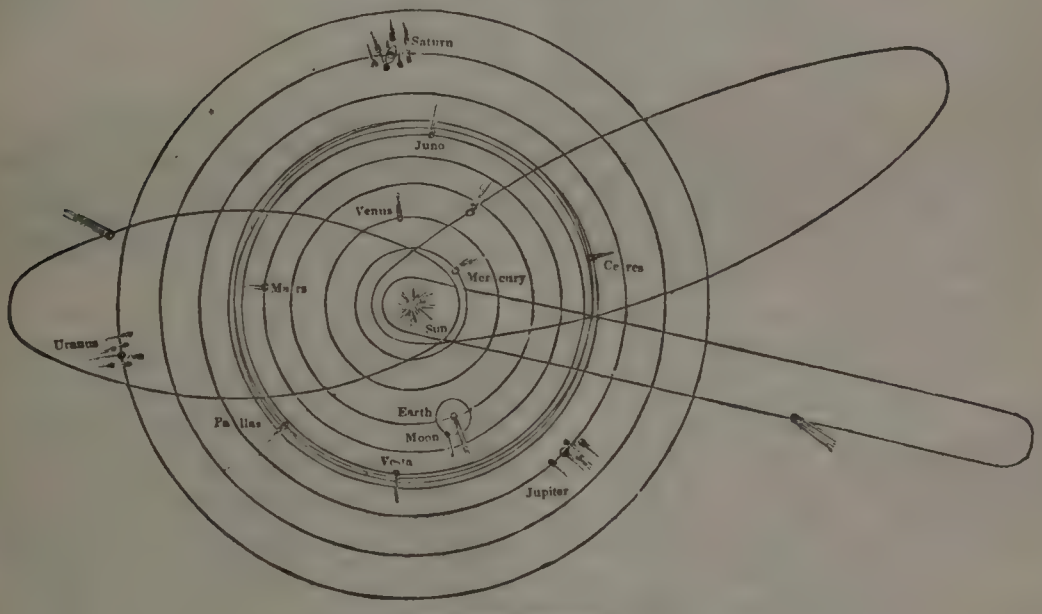
POPULAR ASTRONOMY. PART I.



THE SOLAR SYSTEM.

INTRODUCTION.

"WHEN I consider thy heavens, the work of thy fingers; the moon and the stars, which thou hast ordained;—what is man, that thou art mindful of him? and the son of man, that thou visitest him?"—Psalm viii., 3, 4.

When the inspired Psalmist gave utterance to these words, he was evidently under the influence of those feelings of awe, wonder, and admiration, which are sure to be excited in every intelligent mind, by the splendid and sublime phenomena presented to us by the heavenly bodies. When we consider the magnitude and the number of those bodies, the immense distances which separate them one from another, the almost inconceivable velocity with which they move, and that those which we can see form, probably, but a very small part of the whole number;—when we revolve these things in our minds, we are naturally brought to reflect on our own insignificance in the grand scheme of creation. If a man, after having applied to himself the vain and self-satisfying appellation of "lord of the creation," were to remember that the glorious sun, and the planets which revolve around it, form but one particular division, class, or system in the universe,—that the earth is but an humble member of that system, and that he, man himself, is but a moving particle on the surface of this earth,—he may well be expected to give utterance to the sentiments of David, and to wonder how the Great Deity can regard with parental care so humble a member of so magnificent a whole.

But this feeling, as Addison has beautifully shown, arises from the narrow powers of our own minds. We know that our perceptive faculties soon reach a boundary beyond which we cannot pass: we study the laws of Optics, but we know not the nature of Light:—we feel that we live and think, but we know not what constitutes life and thought. When, therefore, we judge of the Great Creator, by our own standard, we are lost in wonder at the vastness and at the minuteness, as also at the countless number of the objects which are under the Divine protection. But when we consider God as an Omnipresent and Omniscient Being, we then admit, indeed, that nothing is too vast, nothing too minute, nothing too numerous, for his notice; that He who could create and arrange the whole, can also watch over and preserve the minutest parts of that whole. Our notions of great and small are derived from our own imperfect experience, and strikingly show the limited scope of our minds. The distance of the sun from the earth is a quantity so immense, as almost to perplex the mind which reflects on it; and yet that distance is small, compared with the distance of the fixed stars:—again, the minuteness of the nerves and smaller blood-vessels of the human body, is such as to require the microscope to aid us in an examination of their structure, and yet there are other entire animals, endowed with life and powers of motion, which are so minute that the eye cannot perceive them. The words *great* and *small*, then, are for man's use; to the Almighty nothing is great, nothing is small; the revolving planet, and the animalcule whose world is a drop of water, being equally objects of his ever-active care. This divinely-sustaining power of Him, in whom "we live, and move, and have our being," is so obvious, that we may exclaim with the poet Thomson—

> Were every falt'ring tongue of man,
> Almighty Father! silent in thy praise,
> Thy Works themselves would raise a general voice,
> E'en in the depth of solitary woods
> By human foot untrod;—proclaim thy power,
> And to the choir celestial Thee resound,
> Th' eternal cause, support, and end, of all!

Nothing is more calculated to elevate the mind, and to display to us the wonders of Creation, than the study of Astronomy. We propose, therefore, to place before our readers a popular view of the elements, which serve for the basis of the astronomer's study. In doing this, we need not have recourse to the mathematical reasonings on which the various statements of the astronomer are founded; but we shall confine ourselves to such a simple explanation of the Mechanism of the Heavens as may pave the way for the study of a more systematic treatise. We trust, therefore, that both those who have, and those who have not, an opportunity of referring to more elaborate works, will not find the following pages devoid of instruction.

GENERAL APPEARANCE OF THE HEAVENS.

Let us suppose a man to be totally ignorant of Astronomy, and to turn his attention from events occurring upon earth, to those which are presented by the heavens. He sees a brilliant and glowing body, the Sun, rise in the east, at from four to eight o'clock in the morning, (according to the season of the year.) This body gradually attains a considerable altitude in the heavens, and continues to rise until noon;—it then gradually descends, and in its descent, bends towards the west, where it sinks, (apparently below the earth,) some time between four and eight o'clock in the afternoon. The spectator now loses sight of the glorious orb, which does not again become visible for several hours; and when it does again appear, it is not at the point where it escaped from view, but at the opposite side of the heavens, namely, at the point where it first appeared on the preceding day. On watching the progress of the sun, he finds that the path, before noticed, is again travelled over by the luminary, which becomes lost to his view, as before, in the west. A third and a fourth day the same phenomenon occurs; and the question naturally suggests itself to the observer's mind, "Is it the same cheering and dazzling visiter which I see day after day, or are they different bodies, resembling one another, and following one after another?" Were he to confine his attention to the occurrences of only a few days, he would, perhaps, think the latter supposition to be correct, viz., that they were different bodies which thus appeared to him day after day. But if he were to continue his observations for weeks, months, years, or the greater part of his life, and to find that the daily appearance of such a body still continued, he could hardly fail to conclude that it was the same body which thus so frequently attracted his attention and admiration. "But how?" (he might say,) "do I not see this ruddy disc of light dip into the ground in the west, and appear to me again in the east on the following morning: what becomes of it in the meanwhile?" To answer this question, or to obtain the means of answering it, he would, perhaps, trace more particularly the path which the sun followed from morning to evening, which he would find to be a semicircle, or a curve not differing much from it. If, likewise, he were to take note of the time occupied in these occurrences, he would soon find the time that the sun is above the surface of the earth to be, on an average, equal to the time that it is invisible.

From these two facts, it would be by no means unreasonable to arrive at the conclusion, that the sun moves in a circle; and that, while he is invisible to us, he is passing round the earth, in a direction from west to east, at which latter point he arrives at the moment that the observer sees him rise in the morning.

Here a difficulty arises, which it may well be supposed, would perplex the uninitiated observer. What can be meant by going round the earth, if the earth be, as it seems to our eyes, a flat and extended surface of ground, or water, which seems to touch the sky at the farthest points which the eye can reach:—how then can the sun pass round this? There can scarcely be a more reasonable question, so long as we judge merely by what meets the eye; but, if we extend our observations to certain appearances on the ocean, we begin to see proof that the surface of the water is not quite flat. On land, we have not the means of making a similar observation, because of the intervention of mountains and valleys. The proof that the surface of water is not quite flat, is derived from the following circumstance. If we are at sea, on a clear day, and watch the approach of a vessel from a distance, we find that the masts are visible sooner than the hull: we first see the top of the masts; then the whole height of the masts gradually comes into view; and finally, we see the hull. These different appearances of the ship, as it approaches towards the observer, are represented in the following figure. This could not occur if the earth were perfectly flat, because then the hull and masts would come into view at the same time.

It matters not what part of the world be chosen as the place of experiment; the result is almost exactly the same every where, and the amount of the bending of the surface of the ocean may be illustrated thus:—If we had a piece of string four miles long, and were to apply both ends to the surface of still water, and could possibly draw the string into a perfectly straight line, the middle of the string would be about sixteen inches below the surface of the water; thus showing that the water is not quite flat.

Thus might be supposed to arise the first conjecture that the earth is round, like a ball; a fact which was clearly proved by Captain Cook, who was the first to perform a voyage completely round the earth, about the year 1769. He left a given spot, and arrived again at that spot by an opposite course. There is an abundance of proof, derived from other sources, that the earth is a globe; but those will open upon us more plainly, as we advance.

We have hitherto endeavoured to trace what would probably be the feelings and opinions of one who, without previous instruction in Astronomy, should note the appearances presented by the sun. But that golden orb is not seen to be a solitary inhabitant of the sky: another luminous body about as large in apparent size as the sun, would soon attract the notice of the gazer. He would see it rise in the east, soar aloft, and then sink in the west. After the lapse of a few hours it would again appear in the east, attain a height from which

> .....With a boundless tide
> Of silver radiance, trembling round the world,

it would again descend, to sink as before in the west. The train of reasoning which would lead the observer to conclude that the sun revolved round the earth, would lead him to a similar conclusion regarding the moon. But here the resemblance terminates. The sun always presents a perfect circle to the eye of the observer day after day, and month after month; but a few evenings suffice to show that such is not the case with the moon: at one time a crescent only is seen, whose hollow side is towards the left of the observer; at another time the hollow side is towards the right: the crescent sometimes enlarges to a perfect circle; and at others it contracts from a circle to a crescent. If, then, the moon be a ball or globular body, shedding light upon the earth, there is great difficulty in conceiving what can occasion the change in its apparent shape; but, if we were to consider the moon to be an opaque or non-luminous body, we should find the means of explaining the change in its apparent figure, by supposing that the sun shines upon the moon, and that it is only by the reflection of the sun's light from the moon that the moon becomes visible to us. If we place a large round ball on a table, in a place where the sun is shining, we shall see the ball more or less illuminated, according to our position with regard to the ball and the sun: in one position, the ball will appear to be equally divided by a boundary line, into two semicircles, one illuminated and the other in the shade: in another position, the illuminated portion will be only a crescent, all the rest being shaded: from another point again it will all appear illuminated, except a small crescent of shade. If the observer watch the relative positions of the sun and moon, he will see that the shape of the bright part of the moon depends on its relative position in respect of the sun; just as the bright portion of the illuminated ball depended on the position in which he viewed it.

We should in this way find the means of accounting for the change in the shape of the moon. We shall, by and bye, show that these suppositions are really true. But another point would attract the notice of the observer, independently of the change in apparent form. If the two brilliant bodies, the sun and moon, were observed to be near each other on a certain day when the latter appeared as a thin crescent to the left of the sun, they would be seen the next day further removed, and on the following day, at a still greater distance from each other: if, therefore, the motion of the moon round the earth be admitted, it is necessary to suppose that motion to be slower than the sun's motion round the earth.

But in addition to the glowing light of the sun and moon, a glittering assemblage of smaller bodies meets the eye of the observer: a crowd of little spangles adorns the sky when the sun has left it, and softens the dreary darkness which results from his absence. These stars are seen to resemble the sun and moon in the circumstance of rising in or near the east, attaining a certain altitude, and setting in the west; from which circumstance the observer infers

that the stars, like the sun and moon, revolve round the earth. But, by a careful attention to different stars, he would find that the same remark does not apply to all. Those which rise exactly in the east, set exactly in the west; those which rise to the south of east, set south of west; and many which rise somewhat north of east, set somewhat north of west; but in looking northward he sees stars which appear neither to rise nor to set, but which perform a complete circle round a particular point of the heavens. For example,—there are seven stars, which, to most persons who pay any attention to the appearance of the heavens, are known under the name of the Great Bear. These stars never rise or set to an inhabitant of London. If they become invisible, it is either because clouds obscure them, or the superior brilliancy of the sun drowns their comparatively feeble light. The same may be said of five conspicuous stars known by the name of Cassiopeia's Chair.

If we watch the progress of these stars, and others in their vicinity, we shall find that they describe a circle round a star called the Pole-star. The position of this star we shall find to be nearly this: if we suppose the distance from the north point of our horizon (which is the line in which the surface of the earth appears to touch the sky) to the zenith (which is the point immediately over our heads) to be divided into five equal parts, then at about the height of three of those parts from the earth, will be seen the Pole-star.

All this would seem to show to an observer, that the Pole-star is the end of an axis round which all the stars revolve, and that the reason why we cannot see the whole circular path of any stars except of those in the vicinity of the Pole-star, is, that they pass round under the earth during a part of their journey, and are therefore concealed from our view. Those stars which are further removed from the Pole-star describe a larger circle than those which are nearer, while the Pole-star is almost stationary. This is exactly what takes place when we see a wheel turn round; the axle remains in one spot, but any particular point on the outer edge of the wheel describes a larger circle than that which is described by any point between the axle and the circumference.

If we consider the Pole-star to form one end of the axle or axis round which the stars revolve, then it is obvious that there must be an opposite end of the same axis, in the contrary direction. If then we turn towards the south, with the expectation of seeing such a point, we shall find that it will not be realized; for none of the stars in that quarter are seen to describe circles; for they all rise and set. Still, however, the semicircles or portions of semicircles, commonly called arcs, which they describe, appear to have a common centre, which is some distance below the horizon; and this centre may be considered as the southern end of the axis before spoken of.

If we suppose the observer to have arrived at this amount of information respecting the stars, he will be prepared to notice the uniformity of the positions of the stars with respect to one another. The Great Bear, for instance, whether it be under or over the Pole-star, or at the right or the left of it, will always have its seven principal stars at the same relative distances from each other. The changes which take place in the distance of the sun from the moon, would lead to the opinion that these revolve round the earth in unequal times; and by similar reasoning, the constant maintenance of the same distance between any two stars, would seem to imply that the stars revolve in equal times.

The seeming myriads of stars which present themselves to the notice of the observer all appear to follow this rule, of remaining at the same relative distances from one another, with very few exceptions. These exceptions, are, indeed, so few, that a constant watching of the same part of the heavens for a considerable period, would be necessary to determine that a star had actually changed its place relatively to other stars. There have, however, been discovered at different times ten stars, more or less brilliant, which change their relative distances from one another, and from other stars. These we know by the name of Planets; and by a careful attention to their movements, it is seen that each one travels in a curved path among the other stars, and returns again nearly to the point from whence it set out.

At intervals, again, star-like bodies of another order present themselves, whose progress among the other stars is more rapid than that of the planets; and which at a period more or less brief, vanish altogether from the view of the observer, and do not return till after a long absence. To such bodies we give the name of Comets.

Such then are the equally sublime and facinating appearances which present themselves to the eye of an observer, when that eye is directed towards the heavens. That the invigorating and fructifying warmth and light shed by the sun,—the serene, quiet light of the moon,—and the diamond-like glittering of the stars,—should invite men to a study of the laws which, under their Divine Creator, govern the motions of such exquisite globes of light, is what we are not only prepared to expect, but fancy that we should feel disappointment in finding it otherwise. Man is not, by nature, the cold heartless being who can let such beauties pass unheeded; and if he approach the study with the humility which true self-knowledge is calculated to engender, he becomes more and more able to appreciate the surpassing grandeur and power of the great Being who made and who rules all. Well, indeed, may we direct our attention to the phenomena which we have briefly described, and to which Milton so exquisitely alludes in the following lines:—

> First in his East the glorious lamp was seen,
> Regent of day, and all th' horizon round
> Invested with bright rays, jocund to run
> His longitude through Heaven's high road; the gray
> Dawn, and the Pleiades * before him danced,
> Shedding sweet influence: less bright the moon,
> But opposite in levell'd West was set
> His mirror, with full face borrowing her light
> From him; for other light she needed none
> In that aspect, and still that distance keeps
> Till night; then in the East her turn she shines,
> Revolved on Heaven's great axle, and her reign
> With thousand lesser lights dividual holds,
> With thousand thousand stars, that then appear'd
> Spangling the hemisphere: then first adorn'd
> With their bright luminaries that set and rose,
> Glad evening and glad morn crown'd the fourth day.
>
> *Par. Lost*, b. vii.

THEORIES TO EXPLAIN THE MOTIONS OF THE HEAVENLY BODIES.

In very early ages, before Europe occupied a page in the history of nations, the phenomena of the heavens were studied with great attention by several nations of the East. The Chaldeans, the Indians, the Chinese, and the Egyptians, have all left evidences of the industry and ingenuity with which their observations were conducted. They constructed observatories,—invented instruments for observing and measuring with accuracy,—separated the stars into different groups, called Constellations, for the facility of finding any particular star,—gave particular names to most of the moving stars or planets, and noted the period which each took to move through its apparent path in the heavens; and, in many other ways, the ancients helped to lay the foundation of that mass of astronomical knowledge which the men of later ages have brought to more maturity.

Various opinions were formed respecting the motions of the sun, moon, and stars of all kinds, both with reference to one another, and also to the earth; but the first theory which had attained a name and an importance in the early ages of the world, was that of Ptolemy, a distinguished Egyptian astronomer, who lived about one hundred and thirty years after the birth of Christ. He conceived that the various bodies which had been distinguished by the appellation of "the heavenly host," were disposed in the order represented in the annexed diagram.

He supposed, according to the popular opinion, that the Earth was fixed as the centre of the universe, and that the Sun, Moon, Planets, and Stars, revolved round it in the following order; namely—the Moon, Mercury, Venus, Sun, Mars, Jupiter, and Saturn; the Moon being the nearest, and so on; exterior to all of which, he supposed that a great concave sphere in which all the stars were fixed, kept on revolving round the earth. From the early history of Astronomy, we learn that before the time of Ptolemy, it had been conjectured by some, that the earth passed round the sun, and not the sun round the earth; but the difficulty of believing a statement so contrary to appearances and to the evidence of one's physical senses, led to the rejection of this opinion; and although it was afterwards found to be

* Seven small stars clustered together in the constellation Taurus. These stars rise with the sun about the time of Spring, and our poet, in this passage, intimates the old and common opinion that the Creation took place in the Spring.

THE PTOLEMAIC SYSTEM.

correct, yet nearly two thousand years elapsed before such a theory was generally admitted by philosophers.

After Ptolemy had promulgated the theory which bears his name, he found that there were certain difficulties which followed from the adoption of it. He conceived that the seven bodies mentioned before which revolved roun l the earth, moved in the same general direction from West to East. But on watching the progress of some of the planets, he found that they did not appear to travel uniformly round the earth, but seemed to have, at certain times, a retrograde or opposite motion, with reference to the other planets; while at other times they seemed to be stationary. To account for this, he was obliged to suppose that those planets did not revolve in a perfect circle round the earth, but that they described a peculiar path called an epicycloid, of the nature of which some idea may be formed from the following illustration:—if we had a large coach wheel, and by any contrivance could make a smaller wheel roll round the outside of it, at its circumference, then, any particular point on the small wheel would describe that curve which is called an epicycloid: the axle of the small wheel would describe a perfect circle, but it is easy to see that any point on the edge would not describe a circle. Ptolemy was obliged to multiply these epicycloids to a most perplexing extent, in order to account for the various appearances of the planets. It is to this circumstance that Milton alluded, when he spoke of the shifts and difficulties which beset the progress of those who build their opinions on a wrong foundation:—

> When they come to model Heaven
> And calculate the stars, how they will wield
> The mighty frame; how build, unbuild, contrive,
> To save appearances; how gird the sphere
> With centric and eccentric scribbled o'er,
> Cycle and epicycle, orb in orb.——*Par. Lost*, b. viii.

There is nothing which more beautifully shows the power and force of truth, than the embarrassments which retard the progress of those who do not take truth for their guide. In religion, in morals, in science, he whose steps are guided by the light of truth, can arrive, by a short and pleasant path, at results which others can scarcely obtain by a complex and wearying track. Thus Ptolemy was forced to assume the existence of much unwieldly machinery in the scheme of the heavens, in order to account for those motions which are most simple and beautiful; this was because he placed (in his own imagination,) the earth in the midst of the heavenly bodies, all of which were made to revolve round it.

Great as were the difficulties which attended the adoption of the Ptolemaic system, it yet retained its ground, with some slight modifications, until the time of Nicholas Copernicus, an eminent astronomer, who was born at Thorn, in Polish Prussia, in 1473. This distinguished individual perceived the unreasonable results which follow from the theory of Ptolemy. That all the planets, the sun, the moon, and all the stars and comets, should revolve round the earth, seemed to him much more unnatural and complex than that the earth should revolve on its own axis, and move in an orbit round the sun. All the appearances of the heavenly bodies can be explained with much greater ease and simplicity by the latter supposition than by the former; and Copernicus was thus led, after the study of forty years, to the adoption of a theory which had been advocated by Pythagoras and Thales of Greece, five or six hundred years before the time of Ptolemy.

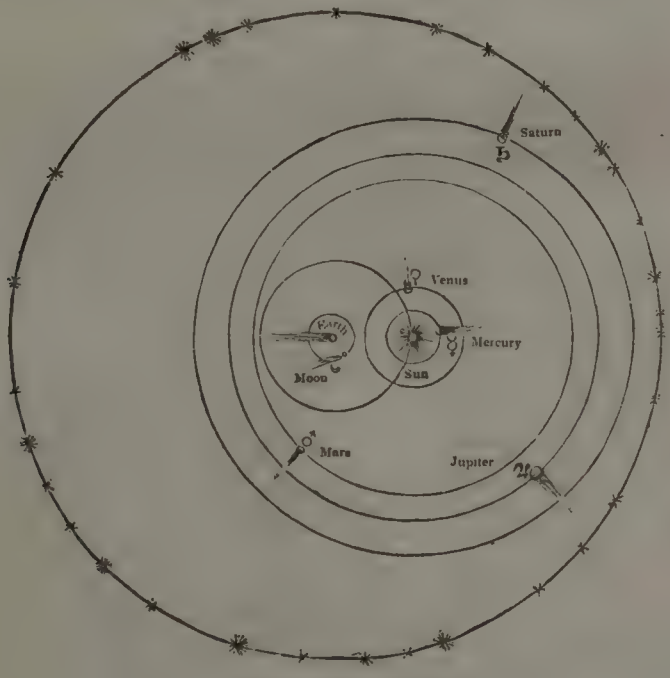
The frontispiece to this number is a representation of the solar system, according to the theory of Copernicus. In this system, the sun, the glorious source of light and heat to us, is placed in the centre. Round him the planets revolve in the following order:—Mercury, Venus, Earth, Mars, Jupiter, and Saturn. Since the time of Copernicus, five more planets have been discovered, namely, Uranus, Pallas, Vesta, Juno, and Ceres. In order to account for the phenomena presented by the moon, Copernicus assumed, (what has since been confirmed,) that the moon has a two-fold motion,—round the earth and round the sun: a small circle, therefore, surrounds the earth, which circle represents the path of the moon round the earth, while the earth and the accompanying moon together revolve round the sun. The frontispiece of course represents the Copernican system with the addition of the five planets since discovered. The circles represent the orbits of the several planets; that is, the paths in which they travel in their progress round the sun. The distances of these circles from the centre at which the sun is placed, could not conveniently be in the same proportion one to another, as the real distance of the planets is respectively from the sun, because the innermost orbits would be too small to be conveniently seen. The real proportions, however, which exist between the distances of the planets from the sun, admit of being easily understood. For instance, the earth, (as we shall hereafter explain more fully) is about ninety-five millions of miles from the sun. If now we call that distance 1, the distances of the other ten planets from the sun, will be represented by the following numbers, with sufficient nearness for our present purpose.

Mercury	$\frac{2}{5}$	Ceres, Pallas	$2\frac{3}{4}$
Venus	$\frac{3}{4}$	Jupiter	$5\frac{1}{2}$
Earth	1	Saturn	$9\frac{1}{2}$
Mars	$1\frac{1}{2}$	Uranus	$19\frac{1}{2}$
Vesta	$2\frac{1}{3}$		
Juno	$2\frac{2}{3}$		

There was an astronomer of very great skill, who lived about the same time as Copernicus, who thought that a mean might be struck between the theories of Ptolemy and Copernicus, by which the favourite idea of a celestial revolution round the earth might still be retained, and so concession might be made both to the growing authority of science, and to the persuasion of men's senses. This astronomer was Tycho Brahé, who was born in 1546, at Knudstrup, in Denmark. The system advocated by him, and which is named from the inventor the Tychonic system, is represented in the annexed diagram.

In this system, which was published about the year 1586, the Sun is considered as a centre, round which five of the planets revolve; namely, Mercury, Venus, Mars, Jupiter and Saturn; while at the same time, the Sun himself, with all those planets, revolves round the Earth. It certainly appears strange that a man of such eminent abilities as Tycho was, should have preferred this ponderous arrangement to the more simple theory advocated by Copernicus. After the death of Tycho, his theory gradually sank in the estimation of philosophers, who found, in the arrangement advocated by Copernicus, the means of explaining celestial phenomena by less complex reasonings than by the theories either of Ptolemy or of Tycho Brahé.

Here, then, we arrive at an important part of our subject; that there are, as we shall hereafter show more clearly, immense bodies revolving in orbits which measure millions of miles across. The appearances presented to the eye



THE TYCHONIC SYSTEM.

lead to an opinion that these bodies revolve round the earth; but a further inquiry into the accompanying circumstances, have led men universally, at the present day, to conclude that the earth and the other planets revolve round the sun.

What then can keep these splendid bodies in motion? How did they first begin to move? And why do they revolve round the sun instead of moving in a straight line? These questions naturally occur to our minds, for our humble faculties can give us but a faint idea of the powers necessary to keep such immense masses in motion. If we see a carriage passing with great rapidity along a railway, we can account for its motion, by tracing the action of steam-pressure upon a piston; which, by connecting machinery, makes the axles of the wheels revolve, and thus sets the whole vehicle in motion. If we see a carriage passing along the street, we can assign a cause for its motion, by the muscular efforts of the horse which is attached to it. If a ball be shot from a cannon, its flight is so rapid as to render it invisible to us, but we can account for its motion by considering that a quantity of gunpowder, small in bulk, suddenly enlarges to about two thousand times its former dimensions, by being converted into gas, when heat is applied; and that the endeavour to obtain two thousand times as much room as it before occupied, acts with such pressure against the ball as to force it out with fearful velocity. All this we can understand, because we can trace the progress of the occurrences step by step. But when we turn to the heavens, we are lost in wonder! Our means of judging admit of no such details of comparison as those which before assisted us; and we are brought to the conclusion that the Almighty, for his own wise purposes, impressed upon the heavenly bodies those motions which we know they possess,—which we can calculate and measure,—but the origin of which we can here never know.

But ought this circumstance to prevent us from studying the nature and extent of the motions impressed upon these glorious bodies? Is it presumptuous in us to endeavour to become acquainted with the laws which, once known, will give us additional proofs of the wisdom and power of the Divine architect of the heavens? Assuredly not! The origin of those movements we know not, but the study of the nature and direction of them is a noble and fitting employment for the human mind.

In the century following the age of Copernicus and Tycho Brahé, there sprang up a genius, who was destined to add more to the amount of human knowledge in this path than any one, perhaps, who had previously existed. This was Sir Isaac Newton, who was born in 1642, at Woolsthorpe, in Lincolnshire. This distinguished man displayed from boyhood an ardent love for the study of the natural phenomena around him. When a child, he made clepsydras, or clocks which told the hour by the descent of water through an orifice at the bottom of a vessel. He also constructed a windmill, which was worked, in part, by a mouse placed inside. As he grew towards manhood, his soaring mind directed itself to the sublime phenomena presented by the heavens, and to the nature and composition of light. That part of his career which more particularly concerns us at present, we will now consider.

When Newton was about twenty-three years of age, he was forced to leave Cambridge where he had been residing, on account of the appearance of the plague at that town. He retired to Woolsthorpe, where, sitting one day in his garden, he saw an apple fall from a tree at his feet. The falling of an apple might have been noticed often enough; but Newton's searching mind directed itself to this inquiry: "Why does the apple fall, when it is loosened from the tree?" Some may laugh at such a question,—some have laughed at it,—and yet the only answer which the laughers

could give, would be, "Because it is the nature of things to fall, when unsupported." This vague explanation did not satisfy the sagacious Newton. He set himself to consider the nature of the occurrence which had attracted his notice, and of others similar to it, and he finished by framing that train of opinions which, under the name of the Theory of Gravitation, laid the foundation of all correct knowledge of the motions of the heavenly bodies, and which is now received by all who deserve the name of philosophers.

> All intellectual eye, our solar round
> First gazing through, he by the blended power
> Of gravitation and projection saw
> The whole in silent harmony revolve.——Thomson.

We shall here find it convenient to consider the nature of this force of gravitation, and will endeavour to do so in the simplest way possible. Every particle of matter in the creation has a tendency to attract, or draw towards itself, every other particle, however distant it may be. We know not what this attraction is; we can therefore only judge of it by its effects. This attraction is of different degrees of force according to the size or density of the attracting body. A small loadstone or magnet will take up a little key, whereas a larger magnet will take up a larger key: so it is with attraction; a lump of lead weighing one pound only, attracts a distant body with half the force which is exerted by another piece of lead weighing two pounds. Again, the force of this invisible agency is subject to variation with respect to the distance between the attracting and attracted bodies. If a mass of lead be the attracting body, and two equal-sized bodies be at some distance from it, the one which is the nearer of the two will be attracted with greater force than that which is further removed. The diminution of attractive power from increase of distance is much more rapid than from the lessening of the size of the attracting body. For instance, if any mass of matter attract another mass with such force as to make it move through twenty feet in a second of time; then, if the first mass be removed to double its former distance, the strength of the attraction will be so much weakened, that the second body will move only five feet in a second, or with one-fourth of its former rapidity.

These simple principles, when applied to such immense bodies as the planets, produce results of a gigantic kind. It may be asked, "If a pound of lead will attract a piece of cork more strongly at the distance of one than of two feet, how is it that we cannot see the proofs of such a fact in practice?" The reason is, that the earth itself forms such an enormous mass of matter that it completely neutralizes the effects of the comparatively small bodies at its surface. In strict truth, if an apple be suspended from the branch of a tree, it tends to attract the earth upwards to meet it; but the attraction of the earth for the apple is so incalculably more powerful, that the moment the apple is loosened from the tree, the earth draws it down to meet it, and that is what occurs when we say that the apple falls. Suppose that, instead of an apple, a mass of lead weighing a thousand pounds, were for a moment suspended in the air; the lead would tend to attract the earth upwards towards itself with much greater force than the apple had done; but still the earth's attraction would so completely overpower the lead, that it would be drawn down to the earth; while the latter would rise to meet it by a quantity, wholly inappreciable by mortal sense, though not by computation.

But let us now suppose a body placed in the universe, equal in size to the earth, but at some distance from it. Here we perceive that there is no reason why the earth should attract the other body more strongly than the latter attracts the earth; accordingly, if they were both free to move, they would naturally approach towards each other, each one moving through half the distance which separated them. If, therefore, we were to suppose that the universe contained many such bodies, each as large as the earth, each one would attract all the others, with a force varying only as the several distances varied. But if one body were very much larger than any of the others, it would attract each of the others more powerfully than itself could be attracted; and would not, therefore, have to move through so great a distance to meet any of the other bodies, as they would have to move through, in order to meet it.

All this admits of being impressed upon the mind with tolerable clearness, so long as we consider the bodies to be in the first instance stationary, and then receiving an impulse. But how can we explain the curved path which each of the heavenly bodies describes in its progress through space; and why do not all the planets get close together by virtue of the attraction which draws them one to another? These questions we cannot answer without a previous attention to other particulars, which we must shortly explain.

If we stand at the top of a high tower, and throw a stone forward to the ground, we shall find that the stone will not proceed on in a straight line, but that it will soon assume a bending path and approach towards the earth. The direction in which this bending occurs, is such as to bring the stone to the earth in a more perpendicular direction than it had when it set out. Now the reason why the stone is thus forced to change the direction in which it first began to move, is, because the earth attracts it and hastens its descent. If we suppose it possible that a hole could be bored through the earth from side to side, we should find the mass of matter would be more accumulated in the direction which passes through the centre of the earth than in any other direction; and as bodies attract other bodies in proportion to their mass of matter, we see reason to believe that a falling stone is attracted more powerfully towards the central direction of the earth, than towards any other part. When, therefore, the stone has left the hand, it gradually tends to a direction perpendicular to the surface of the earth, or it gets into a direction which, if continued, would lead to the centre of the earth.

Now if there were no such force as gravitation, the stone would proceed in the same straight line in which it was first propelled. If it were thrown upward from the surface of the earth, it would continue to travel upwards, without ever again descending to the earth. Here we should remember that there is in nature no such thing as *up* and *down*: but that *up* means simply a departure from the centre of the earth, *down* an approaching towards that centre.

We all know with what amazing velocity a cannon-ball moves, after it has left the mouth of the cannon; yet it soon begins to decline towards the earth, whether it be originally shot from the cannon in a horizontal or in an upward direction. But still the curvature of its path towards the earth is much less rapid than in the case of the stone, because the latter moved so much more slowly. The mortar in St. James's Park can propel a bomb to a distance of about four miles, before it will fall to the earth; whereas a stone thrown by a very powerful arm would certainly fall to the ground within a few hundred yards. Suppose, now, that it were possible to increase to an indefinite extent the velocity with which a cannon-ball would move; say that it should travel ten or twenty miles before it touched the ground; a greater velocity would carry it one hundred miles before it fell: and we may go on in the same train to any extent we please, always bearin mind that, the quicker the body moves, the greater distance will it travel before it falls to the ground. Now, if we assume such a velocity that the ball would travel twenty-five thousand miles before it fell to the earth, we shall arrive at a very curious result. The diameter of the earth is almost eight thousand miles, which gives, for the circumference, about twenty-five thousand miles. The ball would, therefore, have gone completely round the earth before it fell to the ground. If the velocity were still greater it would not reach the ground at the completion of this circuit, but would go on to describe part of another revolution round the earth. When this condition is once attained, the ball might, by a due increase of the projectile force, continue to revolve for ever about the earth, and we should thus have a cast-iron satellite moving around us.

Let not the reader smile at the absurdity of supposing a cannon-ball to travel twenty-five thousand miles; for it will lead us to important results. If we suppose that the sun were stationary in the universe, and that a body very much smaller than the sun were to be projected with immense velocity in a direction at right angles to a line joining the sun and the other body, then the latter (which would proceed in a straight line if the sun were not present) is drawn by the sun into a curved path, the concave or hollow side of which is always towards the sun. If the velocity with which this body were propelled were below a certain limit, it would move in a spiral which would gradually end at the sun himself, to which, therefore, the body would fall: if the velocity were beyond a certain limit, the body would describe a spiral round the sun, but gradually receding from it, and the body would continue through infinite ages to recede farther and farther from the sun: but if a certain velocity, of a corresponding ratio with the attractive power of the sun, were imparted to this body in the first instance,

it would move constantly round the sun, arriving at every revolution at the point from whence it started.

We are now in a condition to explain in some degree how we are to regard the motions of the planets round the sun. When the Almighty had created the various bodies which compose the universe, he exercised his infinite power and wisdom by imparting to them various velocities of motion. The sun being made very much larger than all the planets put together, exerted a more powerful attraction on them than they could exert on him; consequently, the planets were drawn towards the sun out of their original paths, and made to revolve round the larger body. But how shall we sufficiently admire the exquisite skill with which the various velocities were adapted to the size of the various bodies! What parallel can we find in the poor and imperfect works of man, to that surpassing power of adjustment by which the velocities of the planets are regulated! The earth moves some hundreds of thousands of miles in a single day; and yet, if her velocity were to deviate by a small fraction, either more or less, the earth would, in the first case, gradually recede from the sun, and never again approach near him; and in the second case, it would approach to, and fall upon, the sun. It is when such results as these are obtained, that science enables us to appreciate the striking truth, that man's efforts even in his proudest moments, are but poor and humble attempts to follow after, or to imitate, that which the Great Being performs with such boundless perfection. We applaud, and we give rewards to the man, who can make a chronometer which will be accurate within a few seconds in the year; and well may we do so, for it is a signal instance of human industry and ingenuity to produce such an instrument. Yet a mere fraction of such an error in the movements of the bodies composing the solar system, would be fatal to its stability. Truly wonderful, indeed, is it, that the eleven planets should revolve round the sun in periods differing greatly one from another, and at such various distances from him; and yet, that each one should have a velocity so exquisitely adjusted to its size and position as to bring it precisely round to the same point after every entire revolution round the sun. The sun, then, the golden magnet which thus draws all the other planets towards itself, is surrounded with whirling worlds, which borrow their light from him and share it with one another. Well might the poet of the seasons exclaim—

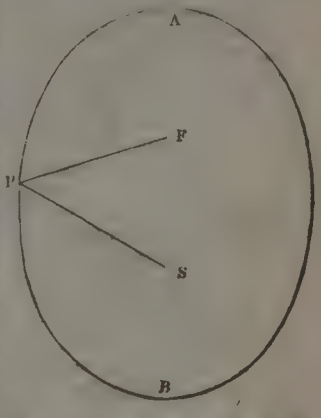
> ..... Thou, O sun!
> Soul of surrounding worlds! in whom best seen
> Shines out thy Maker! May I sing of thee?
> 'Tis by thy secret, strong attractive force,
> As with a chain indissoluble bound,
> Thy system rolls entire: from the far bourne
> Of utmost* Saturn, wheeling wide his round
> Of thirty years, to Mercury, whose disk
> Can scarce be caught by philosophic eye,
> Lost in the near effulgence of thy blaze.

FORM OF THE ORBITS OF THE PLANETS.

Our remarks hitherto have been so expressed as to lead to the conclusion that the planets move in perfect circles round the sun at all times, and under all circumstances. Such, however, is not strictly the case. The paths which they describe are oval or elliptical. Most persons know the form which is meant by the term oval. If we hold an egg in the hand, and look at its outline, it will give a near approach to this form: and, indeed, the word *oval* is derived from *ovum*, the Latin for *an egg*. Such, then, is the form of the paths in which the planets move. Now we may inquire whether the sun is exactly in the middle of this oval, or near either end of it. To this it must be answered that the sun is not precisely in the middle, but that he is a little nearer to one side than the other. It will be useful to give an idea of the position which the sun occupies. Suppose A B represent the orbit or path in which a planet (such as the earth) moves round the sun. (We have made this a larger oval in proportion than the earth's orbit really is, in order that our meaning may be more conspicuous.) There are two points F and S (called *foci*, plural of the Latin word *focus*, signifying *a fire-place*), which have peculiar properties. If we stick a pin in each of the points F and S, and fasten the two ends of a bit of thread to them, (taking care that the thread is just long enough to reach to any one part of the circumference, as at P,) we shall find that we shall be able to make the thread exactly touch every other part of the oval, by stretching it out; but that we cannot make it extend beyond the oval in any direction.

Now it is in one of such points F S that the sun is situated, in the earth's orbit. The oval, if we could possibly see it at once with the eye, would scarcely appear to us to deviate from a circle: it being rather a round, not a long oval. We here speak only of the earth's orbit, but the same remark applies to the orbits of all the planets, which orbits are all more or less oval. We use the term *oval* in preference to the term elliptical, because it is more familiarly known; the meaning of each is, however, the same.

We may now be asked, whether the planets move equably in every part of their orbits,—that is, If a planet move at the rate of so many miles in an hour at one part of its orbit, will it move with the same velocity at another part? This question, on account of the oval form of the paths in which the planets move, must be answered in the negative. They do not move equably in different points of their orbits. Suppose that in the following figure, the point S were like the axle of a wheel, and that twelve equidistant spokes, or radii, reached from it to the boundary of the oval, then the earth, in passing by the end of each spoke during her revolution, would not pass from one to another in exactly equal times, but would take a longer time to pass from spoke to spoke at one part of her revolution than at another. But now let us suppose, that the *time* which the earth takes to revolve round the sun be divided into twelve equal parts, and that we draw a spoke from the axle, or the point S, to the boundaries between all the twelve spaces respectively passed over by the earth in those equal times; then it will be found that the open space between any two adjoining spokes, measures exactly the same number of square miles at every part of the orbit. The spokes towards the end A will be closer together than those towards B, but they will at the same time be longer, so that the excess of length precisely compensates for the deficiency in width. Here is another instance of the admirable adjustment which is observable in the motions of the heavenly bodies. The orbits of the planets are all oval, and differing in the form of the oval; yet the law which we have just stated is found to be constant. The more the orbit approaches to what we may term a long oval, the greater is the difference between the lengths of the spokes towards the two ends. Yet in every case, a disagreement in length is made up by a reverse disagreement in the openings between them, so that these areas or openings are all equal. We have been anxious to avoid every appearance of scientific difficulty in these details; but we will just mention that those who may be able to consult larger works on Astronomy, will find this law thus expressed; that "a planet always describes equal areas in equal times."



Those fleeting and transient visiters, comets, are too seldom in sight to afford the means of making such correct observations of the nature of their orbits, as have been made with respect to the planets. We shall, by-and-by, have to speak individually of several comets, which have appeared at various times, but we now merely refer to their motion generally. It is now believed, from the best observations which have been made, that the comets move in exceedingly long oval orbits, by which means they are at one time very near to the sun, and at other times at an immense distance from him; still, however, the same general resemblance to the orbits of planets is to be noted, and, in addition, that the elongation of the form of the cometary orbit is frequently excessive.

We shall hereafter have to show, that the four largest of the planets have moons, or satellites, revolving round them, of which our moon, the earth's satellite, is the one which attracts a larger share of our attention than any of the others. Now it is interesting to observe, that the moon of itself describes an oval orbit round the earth, in a similar manner as the earth does round the sun. But here a singular effect results:—if the earth were stationary, the moon's orbit would be found, as in the case of the planets,

* Thomson had written this before the year 1730; and the planet Uranus was not discovered until 1781.

to be an oval with respect to the earth; as, however, the earth revolves round the sun, and, of course, carries the moon with it, the real path of the latter becomes a very singular and complicated curve,—it is a zig-zag circle round the sun, with several indentations and as many protuberances.

Thus then do we form some general idea of the manner in which the planets are situated, with respect to one another and to the sun. It will be useful to recapitulate a few points before we proceed further.

We have seen that there is a glorious luminary, the Sun, in the centre of a moving system; that there are eleven planets revolving round him in the following order, beginning from the nearest,—Mercury, Venus, Earth, Mars, Vesta, Juno, Ceres, Pallas, Jupiter, Saturn, and Uranus; that these planets describe paths which are not quite circular but oval, and that the sun is in one focus of the ellipse or oval. The motions of the planets we have likewise found are not uniform, but that their velocities vary according to their distances from the sun. These general details will qualify us to enter upon the consideration of all the planets individually, their dimensions, distances from the sun, velocities of motion, influence upon one another, apparent size as seen from the earth, and many other points of interest to the admirers of the works of God. When that inquiry shall have been completed, we shall enter upon the consideration of those very beautiful and important results, which depend upon the rotation of the planets on their axes,—a species of motion to which we have not hitherto alluded.

We cannot better conclude this portion of our subject than by presenting the reader with the eloquent words of a pious and eminent divine, in connexion with the sublime subject which has thus far occupied us.

"The world in which we live, is a round ball of a determined magnitude, and occupies its own place in the firmament. But when we explore the unlimited tracts of that space which is everywhere around us, we meet with other balls of equal or superior magnitude, and from which our earth would either be invisible, or appear as small as any of those twinkling stars which are seen on the canopy of heaven. Why then suppose that this little spot, little at least in the immensity which surrounds it, should be the exclusive abode of life and intelligence? What reason to think that those mightier globes which roll in other parts of creation, and which we have discovered to be worlds in magnitude, are not also worlds in use and in dignity? Why should we think that the great Architect of nature, supreme in wisdom, as He is in power, would call these stately mansions into existence and leave them unoccupied? When we cast our eye over the broad sea, and look at the country on the other side, we see nothing but the blue land stretching obscurely over the distant horizon. We are too far away to perceive the richness of its scenery, or to hear the sound of its population. Why not extend this principle to the still more distant parts of the universe? What though, from this remote point of observation, we can see nothing but the naked roundness of yon planetary orbs? Are we therefore to say, that they are so many vast and unpeopled solitudes; that desolation reigns in every part of the universe but ours; that the whole energy of the Divine attributes is expended on one insignificant corner of these mighty works; and that to this earth alone belongs the bloom of vegetation, or the blessedness of life, or the dignity of rational and immortal existence?

"But this is not all. We have something more than the mere magnitude of the planets to allege in favour of the idea that they are inhabited. We know that this earth turns round upon itself; and we observe that all those celestial bodies which are accessible to such an observation, have the same movement. We know that the earth performs a yearly revolution round the sun; and we can detect, in all the planets which compose our system, a revolution of the same kind, and under the same circumstances. They have the same succession of day and night. They have the same agreeable vicissitude of the seasons. To them light and darkness succeed each other; and the gaiety of Summer is followed by the dreariness of Winter. To each of them the heavens present as varied and magnificent a spectacle; and this earth, the encompassing of which would require the labour of years from one of its puny inhabitants, is but one of the lesser lights which sparkle in their firmament. To them, as well as to us, has God divided the light from the darkness, and he has called the light day, and the darkness he has called night. He has said, let there be lights in the firmament of their heaven, to divide the day from the night; and let them be for signs, and for seasons, and for days, and for years; and let them be for lights in the firmament of heaven, to give light upon their earth; and it was so. And God has also made to them great lights. To all of them he has given the sun to rule the day; and to many of them has he given moons to rule the night. To them he has made the stars also. And God has set them in the firmament of heaven, to give light upon their earth, and to rule over the day, and over the night, and to divide the light from the darkness; and God has seen that it was good.

"In all these greater arrangements of Divine wisdom, we can see that God has done the same things for the accommodation of the planets that he has done for the earth which we inhabit. And shall we say, that the resemblance stops here because we are not in a situation to observe it? Shall we say, that this scene of magnificence has been called into being merely for the amusement of a few astronomers? Shall we measure the counsels of heaven by the narrow impotence of the human faculties? or conceive, that silence and solitude reign throughout the mighty empire of nature; that the greater part of creation is an empty parade; and that not a worshipper of the Divinity is to be found through the wide extent of yon vast and immeasurable regions?

"It lends a delightful confirmation to the argument, when, from the growing perfection of our instruments, we can discover a new point of resemblance between our Earth and the other bodies of the planetary system. It is now ascertained, not merely that all of them have their day and night, and that all of them have their vicissitudes of seasons, and that some of them have their moons to rule their night and alleviate the darkness of it; we can see of one that its surface rises into inequalities, that it swells into mountains and stretches into valleys; of another, that it is surrounded by an atmosphere which may support the respiration of animals; of a third, that clouds are formed and suspended over it, which may minister to it all the bloom and luxuriance of vegetation; and of a fourth, that a white colour spreads over its northern regions, as its Winter advances, and that, on the approach of Summer, this whiteness is dissipated, giving room to suppose, that the element of water abounds in it, that it rises by evaporation into its atmosphere, that it freezes upon the application of cold, that it is precipitated in the form of snow, that it covers the ground with a fleecy mantle, which melts away from the heat of a more vertical sun; and that other worlds bear a resemblance to our own, in the same yearly round of beneficent and interesting changes.

"Who shall assign a limit to the discoveries of future ages? Who can prescribe to science her boundaries, or restrain the active and insatiable curiosity of man within the circle of his present acquirements? We may guess with plausibility what we cannot anticipate with confidence. The day may yet be coming, when our instruments of observation shall be inconceivably more powerful. They may ascertain still more decisive points of resemblance. They may resolve the same question by the evidence of sense, which is now so abundantly convincing by the evidence of analogy. They may lay open to us the unquestionable vestiges of art, and industry, and intelligence. We may see Summer throwing its green mantle over these mighty tracts, and we may see them left naked and colourless after the flush of vegetation has disappeared. In the progress of years or of centuries, we may trace the hand of cultivation spreading a new aspect over some portion of a planetary surface. Perhaps some large city, the metropolis of a mighty empire, may expand into a visible spot by the powers of some future telescope. Perhaps the glass of some observer, in a distant age, may enable him to construct the map of another world, and to lay down the surface of it in all its minute and topical varieties. But there is no end of conjecture; and to the men of other times we leave the full assurance of what we can assert with the highest probability, that yon planetary orbs are so many worlds, that they teem with life, and that the mighty Being who presides in high authority over this scene of grandeur and astonishment, has there planted the worshippers of His glory."—CHALMERS, *Astronomical Discourses.*

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A REMARKABLE BIRD FROM NEW ZEALAND.

The Apteryx, (*Apteryx Australis.*)

The figure we have given above of this singular bird, has been copied, by permission of the author, from the last part of Mr. Gould's splendid work on the birds of Australia. The scientific world were indebted, in the first instance, for their knowledge of the Apteryx, to the late Dr. Shaw, by whom it was figured and described in the *Naturalist's Miscellany.* This specimen was presented to the doctor by Captain Barclay, of the ship Providence, who brought it from New Zealand in the year 1812. At the death of Dr. Shaw, this, at that time unique, example passed into the possession of the present Earl of Derby. In consequence of no public collection containing a specimen, the naturalists of the Continent were slow in believing in its very existence. M. Temminck considered that, like the dodo, it was an extinct species; while others, among them M. Lesson, believed it was altogether fabulous, and that its description was founded on the remains of the dodo preserved in the British Museum.

Within these few years, the existence of the Apteryx has been well established; its native place is New Zealand, where it is known by the name of *kiwikiwi.* It is hunted at night by the natives, who employ lights to deceive the birds, and dogs to destroy them, the feathers, which are extremely soft, being in high estimation in the manufacture of cloaks of ceremony; "a mat ornamented with them is the most costly dress a chief can wear." So highly prized is a garment of this description, that a European, who had resided in New Zealand for six years, had an opportunity of seeing but one cloak made of these feathers, and no consideration could induce the owner to part with it. Several specimens of the skins of this singular bird have been lately presented to the Zoological Society of London by the New Zealand Association, and its peculiar characters have been better ascertained, although as yet little is known of its habits. It has been stated, that the natives decoy the Apteryx from its lurking place by breaking the dead branch of a tree, the sudden snapping sound produced causing it to start from its concealment.

The peculiar structure of the Apteryx, the length of its bill, the strength of its feet, and the almost entire absence of wings, caused it to be a difficult task to assign it to its proper place in the system. The bill of the Apteryx, being long and slender, at

first sight bears a great resemblance to that of the curlew, but on closer examination a great distinction is observable; the nostrils in the bill of the last bird are always placed at the base, and this is necessary on account of the mode of seeking its food, consisting of worms and other small animals which are found imbedded in mud, into which the bird plunges its bill. If the nostrils were at the tip, they would be filled with earth, and the creature be at least incommoded. The Apteryx, on the other hand, obtains its food from the surface, and, therefore, the placing the nostrils at the extremity is a useful arrangement, by which the organs of smell are brought nearer to the object in view; and this is more necessary on account of its being a nocturnal bird, the darkness causing the eyes to be of little service.

The bird itself is about the size of a three months' old turkey, and of a dark brown colour; the flesh is black, sinewy, tough, and tasteless. Mr. Gould gives his opinion on the subject in the following words:—

A mature consideration of the form and structure of this remarkable bird, lead me to assign it with little hesitation to the family of the *Struthionidæ*, (birds allied to the ostrich) and my reasons for so doing, will, I think, be obvious to every one who will examine and compare the species with the members of that group. The essential characters in which it differs, consist in the elongated form of the bill, the shortness of the tarsi, and in the possession of a sharp spur, terminating a posterior, rudimentary toe. Regarding the ostrich as the species to which it is least nearly related, we find in the emu and the rhea a much nearer approach, not only in the more lengthened form of the bill of the latter, but also in the situation of the nostrils, which, in the rhea, are placed nearer the tip than in any other species of the group, the Apteryx excepted; in fact, when we compare the bills of the two birds, it is evident they are both formed on one plan, that of the Apteryx being an elongated representative of the rhea, with the nostrils placed at the extreme tip.

In both these birds there is the same peculiar elevated horny cere or fold. The tarsi are much shorter, and the nails of the toes much more curved than in the rhea, but the scaly covering of these parts, in both birds, is precisely the same; and it may be further observed, that the number of toes increase as we pass on from the ostrich, there being only two in that bird, three in the rhea, emu, &c., and three, with the rudiment of a fourth, in the Apteryx. The wing of the Apteryx, though scarcely more than rudimentary, agrees with that of the rhea in having a strongly-hooked claw at its extremity, while in the structure of its feathers it approaches the nearest to the cassowary, but unlike what attains in that bird, the feathers are entirely destitute of the accessory plume, in which latter respect it again agrees with the rhea.

The members of this group, although few in number, are remarkable for their structural peculiarities, each being modified for its own peculiar habits and economy, and in none is this circumstance more remarkable than in the Apteryx, which, at the same time that it departs the farthest in form from the type of the group (the ostrich,) also departs the farthest in its mode of life and general economy; being, in fact, adapted to the peculiarities of its own country, and fitted for the particular kind of food there to be obtained.

Although the Apteryx approaches nearer to the rhea than any other known bird, I am inclined to think that several intervening links will yet be discovered between them; indeed, a native of New Zealand who was present at one of the late meetings of the Zoological Society, stated that there is another Apteryx in New Zealand, with a shorter and thicker bill, but which he considered to be the male of the present species. Without doubting that he has spoken to the best of his knowledge, I suspect that it will prove to be distinct, and that the two birds in my plate are representatives of both sexes.

The favourite localities of this bird are low marshy situations, and those covered with extensive and dense beds of fern, among which it conceals itself; and when hard pressed by dogs, the usual method of chasing it, it takes refuge in crevices of rocks, hollow trees, and the deep holes which it excavates in the ground in the form of a chamber; in these latter situations it is said to construct its nest of dried fern and grasses.

While undisturbed, (says Mr. Short, in a letter to Mr. Yarrell,) the head is carried far back in the shoulders, with the bill pointed to the ground; but when pursued, says the native of New Zealand, it runs with great swiftness, carrying the head elevated like the ostrich.

When attacked it defends itself very vigorously, striking rapid and dangerous blows with its powerful feet and sharp spurs, with which it is also said to beat the ground in order to disturb the worms on which it feeds, seizing them with its bill the instant they make their appearance; it also, probably, feeds upon snails and insects. Very recently a perfect specimen of this bird, preserved in spirits, has been received by the Zoological Society of London, and we may shortly expect a full and accurate account of its anatomical structure.

SCRIPTURE PICTURES.

The absurdities of Chinese paintings have been familiar to us from our earliest days, and we have often laughed at the grotesque effects which their ignorance of the art of perspective produces, at their houses apparently hanging in mid-air, and trees growing out of their windows, streams running upwards instead of downwards, and steeples which seem to rival Baron Munchhaussen's.

The art of painting has elsewhere been brought to perfection, yet (in one class of pictures at least) absurdities, less glaring indeed, but not less real, are to be found, in artists too whose names have attained a deservedly high place in the ranks of fame.

In Scripture paintings we shall see representations as untrue to recorded facts as Chinese pictures can be with respect to natural objects; and as objects of sight make a greater impression on us than what we read, the false ideas conveyed in this way have, as might have been expected, taken pretty deep root.

The liberties in which painters have indulged themselves in their representations of the great enemy of man, are most gross, and we might say ridiculous, were it not for the fatal consequences which have attended these absurd representations, and were it not that they have been instrumental in making the doctrine of Satanic influence a matter of scoffing and jest instead of a powerful motive to watchfulness and fear. The Christian painters have pillaged the profane poets for a personification of Satan, and we see on canvass, not the fallen archangel, dreadful in his moral influence over the souls of men, powerless now over their bodies, but the heathen fiction Pan. This latter, with goats' horns, distorted countenance, cloven feet, and long tail, was well suited for the character he was intended to represent for producing panic fears, rustic merriment, and frolic mischief, to those in whose sports and interests he was fabled to take an especial concern. Nor, perhaps, could imagination produce a more grotesque representation, and better adapted for suggesting and keeping alive the associations which led mankind to fable the divinity of Pan, and make him preside over rural affairs and sports. But is there the slightest community between this mixture of frolic, fun, and benevolent care, and that fearful being whom inspired authority represents as a roaring lion, going about seeking whom he may devour; whom the same authority exhorts us to resist steadfastly, and from whose wily attacks even our Lord himself, in his human character, was not exempt? An imperfect knowledge of the manners and customs which prevailed at the time of the

Scripture narrative, has given rise to another class of errors in our Scripture paintings; as an illustration of this, one will readily occur. Those who are acquainted with ancient history, know that it was the custom among the eastern nations, and among the Romans, to recline at meals, instead of sitting as we do. In the pictures of the Last Supper, however, our Lord and his Apostles are represented as sitting round the table; and yet the words of the Evangelist evidently imply a reclining posture; "Now there was leaning on Jesus' bosom one of his disciples whom Jesus loved:" this is intelligible only under the supposition that they were in a recumbent posture, and that consequently the head of one person approached the shoulder of the person that was above him.

There are other mistakes in Scripture representations which appear to arise from an inattention to the Scripture narrative. The Evangelists, and before them the prophets, all describe the Immanuel as having nothing to distinguish Him in outward garb and appearance; "He hath no form nor comeliness," says Isaiah: the people looking upon Him, asked, "Is not this the carpenter's son?" and the very complaint against Him was, that He gave no sign by which they might know Him. Yet in defiance of all this, almost all painters have represented our Lord with that distinguishing mark of a glory round His head, which, had it really existed, would have been a sign unto the people. This mistake may appear unimportant, since not even a child probably can really imagine that this is a true representation. Still the fact is thus far kept out of sight, that there was nothing *external* by which Jesus could be recognised; that they were to judge Him by His works, and that when He did appear under a form that could show His divine original, (as at the transfiguration,) it was only to a chosen few; to Peter, and James, and John, and as a reward, doubtless, for their having believed on Him without a sign.

To an inattention to the Scripture narrative, another very common mistake in Scripture pictures may be traced. It has often been observed how little of our Lord's early history is unfolded to us. But it is remarkable that almost the only fact that is recorded respecting it, and which is given, doubtless, with a view to our imitation and for the sake of the example, is so altered by painters as to be useless to us in this respect. We are told in the Sacred Writings that Jesus at twelve years old went up to Jerusalem after the custom of the feast, and that He was found "in the temple sitting in the midst of the doctors, both hearing them and asking them questions," setting an example (that is) to children, of the humility and desire for instruction which peculiarly becomes their age. Many painters, on the contrary, represent Christ as sitting and teaching, not hearing, in an attitude and place which plainly indicates that He was giving, not receiving, instruction, and the whole force of His example in this respect, as a practical lesson to young people, is consequently lost.

In the representations of our Lord's baptism, there is another very common error committed by painters, which is the more worthy of notice, because it both tends to degrade the subject, and also to keep out of sight what throws light on other passages of Scripture. To illustrate these words of Scripture: "And Jesus, when He was baptized, went up straightway out of the water; and lo, the heavens were opened unto Him, and He saw the Spirit of God descending like a dove and lighting upon Him;" a dove is represented as hovering over Jesus. Many commentators of great merit have understood these words, "descending like a dove," to mean, that the appearance which indicated the descent of the Holy Spirit, had a hovering motion like a dove*; that this appearance was, in fact, a flame of fire which hovered around and descended on Christ, as a bird hovers and lights upon any object. In confirmation of this opinion it has been observed by the Rev. Dr. Hinds, (see his *Three Temples of the one true God*,) that fire, a light from heaven, appears to have been the established sign of God's presence; it was in fire that God appeared to Moses in Midian; it was the Sheckinah which signified Jehovah's abode in the tabernacle; by a pillar of fire God conducted His people through the wilderness, and at the delivery of the law the Most High appeared amidst lightning on Mount Sinai. In later times, at the dedication of the temple at Jerusalem, it was miraculously filled with a glory and a mysterious light; and after our Lord's ascension, it is recorded that, on the day of Pentecost, when the Holy Ghost descended on the apostles, that "there appeared unto them cloven tongues like as of fire, and it sat upon each of them." To represent, then, a bird as descending upon our Lord, seems quite inconsistent with every other account of the appearance of the Divine Spirit which is recorded, and seems an unworthy symbol of Him who, under the more awful imagery of "a consuming fire," is so often mentioned by the inspired writers.

There are many other instances of misrepresentations in Scripture paintings which might be noticed, and which, when once the attention is called to the subject, will be easily detected.

* The words in the original imply that it was a hovering motion, like a dove.

APRIL DAY.

All day the low-hung clouds have dropt
Their garnered fulness down;
All day that soft, gray mist hath wrapt
Hill, valley, grove, and town.

There has not been a sound to-day
To break the calm of nature;
Nor motion, I might almost say,
Of life, or living creature;—

Of waving bough, or warbling bird,
Or cattle faintly lowing;—
I could have half believed I heard
The leaves and blossoms growing.

I stood to hear,—I love it well,—
The rain's continuous sound;
Small drops, but thick and fast they fell,
Down straight into the ground.

For leafy thickness is not yet
Earth's naked breast to screen,
Though every dripping branch is set
With shoots of tender green.

Sure since I looked at early morn,
Those honeysuckle buds
Have swelled to double growth; that thorn
Hath put forth larger studs.

That lilac's cleaving cones have burst,
The milk-white flowers revealing:
Even now, upon my senses first
Methinks their sweets are stealing.

The very earth, the streamy air,
Is all with fragrance rife!
And grace and beauty everywhere
Are flushing into life.

Down, down they come—those fruitful stores,
Those earth-rejoicing drops!
A momentary deluge pours,
Then thins, decreases, stops.

And here the dimples on the stream
Have circled out of sight;
Lo! from the west, a parting gleam
Breaks forth of amber light.

ILLUSTRATIONS OF THE BIBLE FROM THE MONUMENTS OF ANTIQUITY. No. XI.

FISHING BY THE LINE.

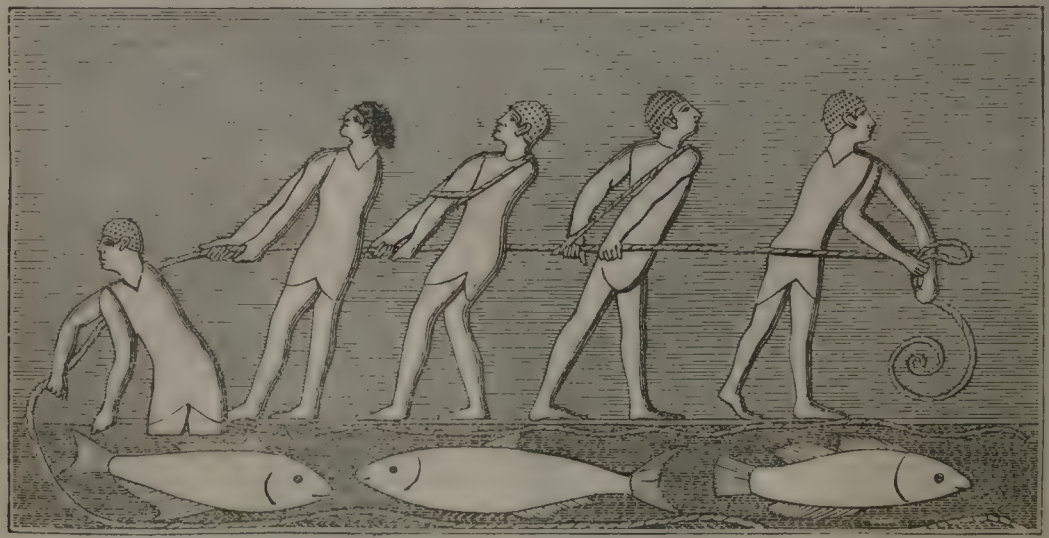
The Plagues of Egypt, 2.

In the Scripture account of the first plague, it is mentioned that "the fish that was in the river died:" this was a fearful aggravation of the plague, for fish was a favourite article of food in Egypt, and few employments are more frequently depicted on the monuments than those connected with catching and curing the fish of the river.

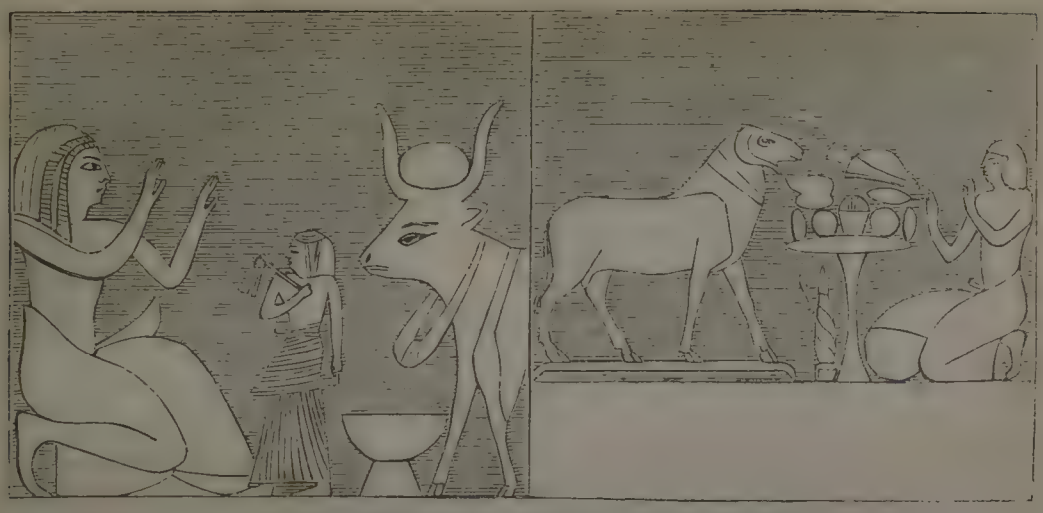
We are informed that the ancient Egyptians had a religious scruple against using any of the produce of the sea; hence the fisheries of the Nile were peculiarly valuable. The Egyptians indeed were the first people who practised the art of curing and preserving fish: they both dried them in the sun and salted them. For the latter purpose fossil salt was largely imported from the African deserts. It must also be observed that the destruction of the fish was a punishment operating directly on Pharaoh himself, for the principal fisheries belonged to the crown; and we are informed by Diodorus Siculus that a portion of the revenue derived from them was assigned to the queens as pin-money. There were several varieties of fish, so as to gratify every palate; and hence, when the Israelites began to murmur against Moses in the wilderness, one of their chief complaints was, "We remember the fish that we did eat in Egypt freely."

Some writers have rashly asserted that fresh-water fish do not abound in Egypt, but their error has arisen from their having visited the country when the waters of the Nile were at the lowest. As, however, advantage has been taken of their authority to impugn the Scripture narrative, we shall extract from M. Michaud an account of the present state of the fisheries on the lake Menzaleh.

The waters of Menzaleh are very productive: the Arabs assert that it contains as many kinds of fish as there are days in the year. Whatever may be the number of species, they multiply with amazing rapidity. The fisheries of Menzaleh have been always farmed out by the government of Egypt: they formed an important item in the revenues of the Circassian sultans and the Mamelukes, and at present they yield eight hundred purses annually to Mohammed Ali, which is rather more than 8000*l*. The lake contains several clusters of islets, but those called the Matharian are alone inhabited. Their population, however, is so numerous that there is scarce room on the ground to plant a shrub, and huts are mixed confusedly with tombs. The entire population is engaged in catching or curing fish: the best fishing grounds are portioned into divisions by reeds and rushes, forming as it were the farms of the fishermen, and these private properties are far more respected than the fields of the unhappy *fellahs*. The inhabitants of the Matharian islets have all the jealousies of insular people: woe betide the strange fisherman who would venture his boat into their petty archipelago or who would be caught let-



FISHING WITH THE NET.



ANIMAL WORSHIP AND SACRIFICES OF THE EGYPTIANS.

ting down his nets near their islands. We went into the village of *Kafi-al-Nossarah*, situated at the western extremity of the lake: near the village is a kind of harbour for the fishing boats: some of these have sails, others are impelled by oars or a long pole. The village is built of mud and reeds; the inhabitants are huddled together in wretched huts; the children are naked. The men wear coarse caps, fitting tight to the head, and either loose drawers or a cincture like the Scottish kilt. Their physiognomy has something of a sorrowful and savage cast. There are about seventeen villages round the lake Menzaleh, the sole employment of whose inhabitants is fishing: it is also their only resource. With the salt fish which they send to Cairo, Syria, and the interior of Africa, they purchase dates, rice, coarse cloth, wood to build their boats, hemp for their lines and nets, and fire-arms for fowling or defence. Not less barbarous than the Bedouin Arabs, they have only a vague notion of the Koran; they scarcely can count the days of the year, and the only means they have of determining the hour of the day is by the projection of their shadows.

From the prophet Isaiah we learn that the Egyptian fisheries were in his day reckoned among the most valuable possessions of the nation, and that they knew the art of catching fish, not only with the line but the net. This is fully confirmed by the monuments, on which we find both modes of fishing delineated. Isaiah's severe denunciation of divine wrath includes little more than a portion of the first plague, actually inflicted by Moses.—"And they shall turn the rivers far away, and the brooks of defence shall be emptied and dried up: the reeds and flags shall wither. The paper reeds by the brooks, by the mouth of the brooks, and everything sown by the brooks, shall wither, be driven away, and be no more. The fishers also shall mourn, and all they that cast angle into the brooks shall lament, and they that spread nets upon the waters shall languish. . . . . And they shall be broken in the purposes thereof, all that make sluices and ponds for fish." (Isaiah xix. 6—10.)

The circumstances we have mentioned are fully sufficient to show how severe was this first plague, and they also prove that the Scripture narrative is supported by all that we know of the natural condition of Egypt, and all that we can learn from its historic records.

It is said further by the sacred historians, "the magicians of Egypt did so with their enchantments:" to this two objections have been made; first, that there are no means by which jugglers could imitate such a miracle, and secondly, that all the waters were already changed. Now it seems pretty clear that in the second objection we can find an answer to the first. The magicians could easily procure fresh water by digging, and an illusion similar to the change effected by the miracle is possible with small quantities of water. Among the tricks mentioned by the Emperor Jehangueir in his account of the performances of the Indian jugglers, to which we have already referred, there are several performed with vessels of water: one of them deserves to be quoted.

They filled a large vessel with water perfectly transparent, and placed it on the floor before me. One of them had in his hand a red rose, which he said, by giving it a dip into the water, he could bring it out of any colour I chose to mention. Accordingly he gave the rose a plunge, and out it came of a bright yellow; and thus at every dip he brought it out of a different kind and colour. They then plunged a skein of white thread into the vessel, and brought it out first of a red then of a yellow colour, and so of a different colour a hundred times repeated, if they were required so to do.

The distinction between the miracle and its spurious imitation is sufficiently explained in the Scripture narrative: Moses smote the river; the magicians practised their art only on some limited quantity of water, and in such a case deception was not only practicable but easy.

The second plague of frogs is remarkable, because the beloved river the Nile is again made the instrument of punishment, and because it was imitated by the magicians. The third plague of lice, (or, as the word *kinnim* may perhaps be translated, musquitoes,) was beyond the power of the jugglers, for they at once acknowledged the supernatural character of the miracles wrought by Moses and Aaron, exclaiming, "This is the finger of God!" Such an exclamation fully proves that their former attempts to rival Moses and Aaron were juggling delusions. The Jewish and Arabian traditions concur in asserting that some of the magicians were on this occasion converted to the worship of the true God, and were in consequence persecuted by the Egyptian tyrant.

After the fourth plague of flies an important incident is recorded, which throws considerable light on the preceding part of the narrative. "And Pharaoh called for Moses and Aaron, and said, Go ye, sacrifice to your God in the land. And Moses said, It is not meet so to do; for we shall sacrifice the abomination of the Egyptians to the Lord our God: lo, shall we sacrifice the abomination of the Egyptians before their eyes, and will they not stone us?"

The proposal of Pharaoh is one which could never have been made by a native Egyptian, for it is clear from what follows that the Hebrews were notoriously about to sacrifice some of the animals deemed sacred by the Egyptians. The cow, reverenced as the emblem of Isis, and the ram, which typified Ammon, were held objects of religious worship among the Egyptians, and we find their votaries on the monu-

ments actually engaged in this degrading adoration. A foreign conqueror like Pharaoh might despise, or at least be reckless of, the national superstition; but a native prince would have never sanctioned so gross a violation of his country's most inveterate usages.

The accuracy of the sacred historian in this important passage will be still more apparent, if we enter upon a brief examination of the Zoolatry, or animal worship, of Egypt. Some were divinely honoured because they were feared, others on account of their utility. Those most reverenced were the single bull Apis, the cow, the sheep, the cat, the dog, the wolf, the crocodile, the ibis, the ichneumon, and the hawk. Lands were set apart for the support of those sacred animals whilst they were living; men and women were employed in feeding and maintaining them, and children succeeded their parents in the office, which was so far from being declined, or thought despicable by the Egyptians, that they considered it the most honourable of all employments, and wore certain cognizances as signs of their office, which were always saluted with great respect by their countrymen. If a person killed any of these sacred animals designedly, he was punished with death; if involutarily, his punishment was referred to the priests; but if a man killed either a cat, a hawk, or an ibis, whether by design or not, he was to die without mercy, and the enraged multitude seldom waited even for the formalities of trial. While Diodorus Siculus, the celebrated historian, was in Egypt, he witnessed an example of this sanguinary bigotry. A Roman, in the train of an embassy sent to conclude a peace with the king, happened accidentally to kill a cat; a mob instantly gathered round the house, and neither the remonstrances of the royal officers, nor fear of the Roman power, could mitigate their ferocity, or save the unfortunate man's life. On this account, if any one by chance found one of these sacred animals dead, he stood at a convenient distance from it, and with great lamentations protested that he was innocent of the death. And what may seem still more incredible, it is reported that, in time of famine, which drove the inhabitants to the cruel necessity of devouring one another, there was no person accused of having tasted of any of these sacred animals. When any one of these animals died, they lamented them as if they had been their dearest children, and frequently expended vast sums on their funeral. We are told that, in the beginning of the reign of Ptolemy, the son of Lagus, the bull Apis, dying of old age at Memphis, his keeper expended more than fifty talents of silver, or 13,000*l.* on his costly interment.

On the history of the remaining plagues it is unnecessary to dwell, for they are evidently of such a nature as to be scarcely susceptible of illustration from monuments. The murrain of the beasts, and the plague of boils and blains, were followed by two particularly alarming to the Egyptians; the storm of thunder, lightning, and hail must have been exceedingly formidable in a land where these atmospheric phenomena are scarcely known; the plague of locusts is to this day dreaded as one of the most grievous visitations to which eastern nations are exposed, and the plague of "darkness which could be felt," was well calculated to strike terror into a nation, which made the sun-god the chief object of its idolatry, and in whose country a fog, or even a dense mist, is never produced by nature. The smiting of the first-born, was the fearful consummation of these Divine judgments; Pharaoh and his subjects hasted to send the Israelites away, and they quitted the land of Egypt. We have seen that, from the first visit of Abraham down to the departure of Moses, every particular mentioned by the sacred historian is minutely confirmed by monuments now brought to light after a concealment of more than two thousand years, and that the authenticity of the Pentateuch is supported by contemporary records; for monuments are records removed beyond the chances of error in transcription, or the possibility of modern corruption.

ON THE USES OF KNOWLEDGE.

THE first end to which all wisdom or knowledge ought to be employed, is to illustrate the wisdom or goodness of the Father of Nature. Every science that is cultivated by men leads naturally to religious thought, from the study of the plant that grows beneath our feet, to that of the host of heaven above us, who perform their stated revolutions in majestic silence, amid the expanse of infinity. When in the youth of Moses, "the Lord appeared to him in Horeb," a voice was heard, saying, "draw nigh hither, and put off thy shoes from off thy feet; for the place where thou standest is holy ground." It is with such a reverential awe that every great or elevated mind will approach to the study of nature, and with such feelings of adoration and gratitude, that he will receive the illumination that gradually opens upon his soul.

It is not the lifeless mass of matter he will then feel that he is examining,—it is the mighty machine of eternal wisdom; the workmanship of Him, "in whom every thing lives, and moves, and has its being." Under an aspect of this kind, it is impossible to pursue knowledge without mingling with it the most elevated sentiments of devotion;—it is impossible to perceive the laws of nature without perceiving, at the same time, the presence and the providence of the Lawgiver:—and thus it is that, in every age, the evidences of religion have advanced with the progress of true philosophy; and that science, in erecting a monument to herself, has, at the same time, erected an altar to the Deity.

The knowledge of nature is not exhausted. There are many great discoveries yet awaiting the labours of science, and with them there are also awaiting to humanity, many additional proofs of the wisdom and benevolence "of Him that made us." To the hope of these great discoveries few indeed can pretend; yet let it ever be remembered, that he who can trace any one new fact, or can exemplify any one new instance of divine wisdom or benevolence in the system of nature, has not lived in vain; that he has added to the sum of human knowledge, and, what is far more, that he has added to the evidence of those greater truths upon which the happiness of time and eternity depends.

The second great end to which all knowledge ought to be employed, is to the welfare of humanity. Every science is the foundation of some art beneficial to men; and while the study of it leads us to see the beneficence of the laws of nature, it calls upon us also to follow the great end of the Father of Nature in their employment and application. I need not say what a field is thus opened to the benevolence of knowledge;—I need not tell you that, in every department of learning, there is good to be done to mankind;—I need not remind you, that the age in which we live has given us the noblest examples of this kind, and that science now finds its highest glory in improving the condition, or in allaying the miseries of humanity. But there is one thing, of which it is ever proper to remind you, because the modesty of knowledge often leads us to forget it,—and that is,

that the power of scientific benevolence is far greater than that of all others, to the welfare of society.

The benevolence of the great or the opulent, however eminent it may be, perishes with themselves; but the benevolence of knowledge is of a kind as extensive as the race of man, and as permanent as the existence of society. He, in whatever situation he may be, who, in the study of science, has discovered a new means of alleviating pain, or of remedying disease; who has described a wiser method of preventing poverty, or of shielding misfortune; who has suggested additional means of increasing or improving the beneficent productions of nature, has left a memorial of himself which can never be forgotten, which will communicate happiness to ages yet unborn, and which, in the emphatic language of scripture, renders him a "fellow-worker" with God himself, in the improvement of his creation.

The third great end of all knowledge is the improvement and exaltation of our own minds. It was the voice of the Apostle, "What manner of men ought ye to be, to whom the truths of the Gospel have come?" It is the voice of nature also, "What manner of men ought ye to be, to whom the treasures of wisdom are opened?" Of all the spectacles, indeed, which life can offer us, there is none more painful or unnatural, than that of the union of vice with knowledge. It counteracts the great designs of God in the distribution of wisdom, and it assimilates men not to the usual characters of human frailty, but to those dark and malignant spirits who fell from heaven, and who excel in knowledge only that they may employ it in malevolence.

To the wise and virtuous man, on the contrary, —to him whose moral attainments have kept pace with his intellectual, and who has employed the great talent with which he is intrusted to the glory of God, and to the good of humanity,—are presented the sublimest prospects that mortality can know. "In my Father's house," says our Saviour, "are many mansions;" mansions, we may dare to interpret, fitted to the different powers that life has acquired, and to the uses to which they have been applied.

Of that great scene, indeed, which awaits all, whether ignorant or wise, it becomes us to think with reverential awe. Yet we know, "that it will then be well with the good, though it will not be well with the wicked;" and we are led by an instinctive anticipation, to suppose that they who here have excelled in wisdom and benevolence, will be rewarded with higher objects, upon which they may be employed, and admitted into nearer prospects of the government of eternal wisdom. "In his light they shall see light." "They shall see him, not as through a glass darkly; but as he is. They shall know, even as they themselves are known."—ALISON.

CRICKETS.

(*Gryllus campestris,*) or FIELD-CRICKET.

THERE is a steep abrupt pasture-field, interspersed with furze, close to the back of this village (Selborne), well known by the name of the *Short Lithe*, consisting of a rocky dry soil, and inclining to the afternoon sun. This spot abounds with the *Gryllus campestris*, or Field-Cricket, which, though frequent in these parts, is by no means a common insect in many other counties.

As their cheerful summer cry cannot but draw the attention of a naturalist, I have often gone down to examine the economy of these *Grylli*, and study their mode of life; but they are so shy and cautious, that it is no easy matter to get a sight of them, for hearing a person's footsteps as he advances, they stop short in the midst of their song, and retire backward nimbly into their burrows, where they lurk till all suspicion of danger is over.

At first we attempted to dig them out with a spade, but without any great success; for either we could not get to the bottom of the hole, which often terminated under a great stone, or else in breaking up the ground we inadvertently squeezed the poor insect to death. Out of one so bruised we took a multitude of eggs, which were long and narrow, of a yellow colour, and covered with a very tough skin. By this accident we learnt to distinguish the male from the female; the former of which is shining black, with a golden stripe across its shoulders; the latter is more dusky, more capacious about the abdomen, and carries a long sword-shaped weapon at her tail, which probably is the instrument with which she deposits her eggs in crannies and safe receptacles.

When violent methods will not avail, more gentle means will often succeed, and so it proved in the present case; for, though a spade be too boisterous and rough an implement, a pliant stalk of grass, gently insinuated into the caverns, will probe their windings to the bottom, and quickly bring out the inhabitant, and thus the humane inquirer may gratify his curiosity without injuring the object of it.

It is remarkable that, though these insects are furnished with long legs behind, and brawny thighs for leaping, like grasshoppers, yet when driven from their holes they show no activity, but crawl along in a shiftless manner, so as easily to be taken; and, again, though provided with a curious apparatus of wings, yet they never exert them when there seems to be the greatest occasion. The males only make that shrilling noise, which is raised by a brisk friction of one wing against the other. They are solitary beings, living singly, male or female, each as it may happen. When the males meet they will fight fiercely, as I found by some which I put into the crevices of a dry stone wall, where I should have been glad to have made them settle. For though they seemed distressed by being taken out of their knowledge, yet the first that got possession of the chinks, would seize on any that obtruded upon them with a vast row of serrated fangs. With their strong jaws, toothed like the shears of a lobster's claws, they perforate and round their curious regular cells, having no fore-claws to dig, like the Mole-Cricket. When taken in hand, I could not but wonder that they never offered to defend themselves, though armed with such formidable weapons. Of such herbs as grow before the mouths of their burrows they eat indiscriminately, and on a little platform, which they make just by, they drop their dung, and never in the day-time seem to stir more than two or three inches from home. Sitting in the entrance of their caverns, they chirp all night as well as day, from the middle of the month of May to the middle of July, and in the hot weather, when they are most vigorous, they make the hills echo, and in the still hours of darkness may be heard to a considerable distance. In the beginning of the season their notes are more faint and inwards, but become louder as the Summer advances, and so die away again by degrees.

Sounds do not always give us pleasure according to their sweetness and melody, nor do harsh sounds always displease. We are more apt to be captivated or disgusted with the associations which they promote, than with the notes themselves. Thus the shrilling of the Field-Cricket, though sharp and stri-

dulous, yet marvellously delights some hearers, filling their minds with a train of Summer ideas of everything that is rural, verdurous, and joyous.

About the 10th of March the Crickets appear at the mouths of their cells, which they then open and bore, and shape very elegantly. All that ever I have seen at that season were in their pupa state, and had only the rudiments of wings lying under a skin or coat, which must be cast before the insect can arrive at its perfect state, from whence I should suppose that the old ones of last year do not always survive the Winter. They cast these skins in April, which are then seen lying at the mouths of their holes. In August their holes begin to be obliterated, and the insects are seen no more till Spring.

(*Gryllus domesticus,*) or House-Cricket.

While many other insects must be sought after in the fields, and woods, and waters, the *Gryllus domesticus*, or House-Cricket, resides altogether within our dwellings, intruding itself upon our notice whether we will or no. This species delights in new-built houses, being, like the spider, pleased with the moisture of the walls; and, besides, the softness of the mortar enables them to burrow and mine between the joints of the bricks or stones, and to open communications from one room to another. They are particularly fond of kitchens and bakers' ovens, on account of their constant warmth.

Tender insects that live abroad either enjoy only the short period of one Summer, or else doze away the cold uncomfortable months in profound slumbers; but these, residing as it were in a torrid zone, are always alert and merry: a good Christmas fire is to them like the heats of the dog-days. Though they are frequently heard by day, yet is their natural time of motion only in the night. As soon as it grows dusk, the chirping increases, and they come running forth, and are from the size of a flea to that of their full stature. As one might suppose, from the burning atmosphere which they inhabit, they are a thirsty race, and show a great propensity for liquids, being found frequently drowned in pans of water, milk, broth, or the like. Whatever is moist they affect; and therefore often gnaw holes in wet wollen stockings and aprons that are hung to the fire: they are the housewife's barometer, foretelling her when it will rain; and are prognostics sometimes, *she thinks*, of ill or good luck. These Crickets are not only very thirsty, but very voracious; for they will eat the scummings of pots, and yeast, salt, and crumbs of bread; and any kitchen offals or sweepings. In the Summer we have observed them to fly, when it became dusk, out of the windows, and over the neighbouring roofs. This feat of activity accounts for the sudden manner in which they often leave their haunts, as it does for the method by which they come to houses were they were not known before. It is remarkable that many sorts of insects seem never to use their wings but when they have a mind to shift their quarters and settle new colonies. When in the air they move *volatu-undoso*, in waves or curves, like *woodpeckers*, opening and shutting their wings at every stroke, and so are always rising or sinking.

When they increase to a great degree, they become noisome pests, flying into the candles, and dashing into people's faces: but they may be blasted and destroyed by gunpowder discharged into their crevices and crannies. Their shrilling noise is occasioned by a brisk attrition of their wings. Cats catch hearth-crickets; and, playing with them as they do with mice, devour them. Crickets may be destroyed, like wasps, by phials half filled with beer, or any liquid, set in their haunts; for, being always eager to drink, they will crowd in till the bottles are full.

(*Gryllus gryllo talpa,*) or, Mole-Cricket.

How diversified are the modes of life not only of incongruous but even of congenerous animals; and yet their specific distinctions are not more various than their propensities. Thus, while the *Field-Cricket* delights in sunny dry banks, and the *House-Cricket* rejoices amidst the glowing heat of the kitchen hearth or oven, the *Gryllus gryllo talpa*, (the Mole-Cricket,) haunts moist meadows, and frequents the sides of ponds and banks of streams, performing all its functions in a swampy wet soil. With a pair of fore-feet curiously adapted to the purpose, it burrows and works under ground like the mole, raising a ridge as it proceeds, but seldom throwing up hillocks.

As *Mole-Crickets* often infest gardens by the sides of canals, they are unwelcome guests to the gardener, raising up ridges in their subterraneous progress, and rendering the walks unsightly. If they take to the kitchen quarters, they occasion great damage among the plants and roots, by destroying whole beds of cabbages, young legumes, and flowers. When dug out they seem very slow and helpless, and make no use of their wings by day; but at night they come abroad and make long excursions, as I have been convinced by finding stragglers, in a morning, in improbable places. In fine weather, about the middle of April, and just at the close of day, they begin to solace themselves with a low, dull, jarring note, continued for a long time without interruption, and not unlike the chattering of the fern-owl, or goat-sucker, but more inward.

About the beginning of May they lay their eggs, as I was once an eye-witness; for a gardener, at a house where I was on a visit, happening to be mowing, on the sixth of that month, by the side of a canal, his scythe struck too deep, pared off a large piece of turf, and laid open to view a curious scene of domestic economy.

There were many caverns and winding passages leading to a kind of chamber, neatly smoothed and rounded, and about the size of a modern snuff-box. Within this secret nursery were deposited near an hundred eggs of a dirty yellow colour, and enveloped in a tough skin, but too lately excluded to contain any rudiments of young, being full of a viscous substance. The eggs lay but shallow, and within the influence of the sun, just under a little heap of fresh moved mould, like that which is raised by ants.

When Mole-Crickets fly, they move *cursu undoso*, rising and falling in curves, like the other species mentioned before. In different parts of this kingdom people call them *fen-crickets*, *churr-worms*, and *eve-churrs*, all very apposite names.

Anatomists who have examined the intestines of these insects, say, that from the structure, position, and number of their stomachs, or maws, there seems to be a good reason to suppose that this and the two former species *ruminate* or *chew* the *cud* like many quadrupeds.

[White's *Natural History of Selborne.*]

It is a most Christian exercise to extract a sentiment of piety from the works and appearances of nature.—Chalmers.

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KILLARNEY. No. VII.

MACGILLICUDDY'S REEKS, FROM AGHADOE.

THE MOUNTAINS—MACGILLICUDDY'S REEKS.

As the two lower lakes at Killarney lie at the foot of the range of mountains upon which the third, or Upper Lake is situated, the side of them turned towards that lake, or, in other words, their western shores, are bounded by those mountains. The first mountain in the chain which thus separates the Lower Lakes from the Upper Lake is that of Turk. It forms the boundary of the south-western side of the middle lake, which has from that circumstance received the appellation of Turk Lake. By the side of this mountain there is a defile in the chain, through which flows the river from the Upper Lake.

The next mountain to the northward, or that upon the opposite side of the defile, is Glena, which bounds a portion of the western side of the Lower Lake. It projects forward beyond the line of Turk Mountain, and forms, in fact, a promontory jutting out into the lake; thus it presents two sides to the water, one of them overhanging the bay of Glena, as the corner of the lake to the southward is called, and the other opening to the northward upon the broadest part of the lake. Both of these mountains rise abruptly from the water, and are marked by numerous bold breaks and projecting rocks. The summit of Glena mountains is "bare, naked, barren, wild, and rugged," while the base is clothed with trees of rich and varied shades, almost dipping their foliage in the water

Tomies Mountain, the next in succession to the northward, and the last whose base is washed by the lake, rises more gradually than the others, and at its sloping base presents to view a considerable tract of fertile ground, which is under cultivation.

Until the sun has ascended to his meridian height, the mountains bordering upon the Lower Lake remain in shadow. Their surface then appears tame and unvaried, and their summit, if it be in clear weather, forms a hard outline against the azure sky; but, as the day advances, the sun crosses the line of the great chain, and darts his rays on that side of the mountains which lies next to the lake. All their bold irregularities are then revealed, their protruding rocks, their deep glens; "and the lake, illumined by the gleams which pass athwart its peaceful waves, appears resplendent amidst the dark and wooded islands:"—

> ..... The horizontal clouds
> With purple dyes and fissures edged with gold,
> Streak the calm ether, while through the sparkling haze
> The faint hills glimmer; fainter as their chains
> Approach the fount of brightness; fainter still
> Where sunk the parting orb, and with the sky
> In undistinguishable splendour joined.

Mr. Weld says that he has sometimes imagined that the sun set with more splendour at Killarney than in other parts of the country; indeed, he adds, there can be no doubt that the diversity of light and colours in the sky is augmented by the vast collections of clouds which are attracted by the mountains as they come from the Atlantic,—

> Or whirled tempestuous by the gusty wind,
> Or silent borne along, heavy and slow,
> With the big stores of steaming ocean charged.

These clouds, he says, not only occasion the most grand and beautiful effects at the approach of evening, but "exhibit infinite vicissitudes of light and shade throughout the day, altering every hour the face of the landscape." An older writer expresses a similar opinion, stating that the effect of the view is, in his opinion, much heightened by the hourly revolutions in the face of the heavens.

The vast volumes of clouds which are rolled together from the Atlantic and rest on the summits of the mountains, clothe them with majesty: the different masses of light and shade traversing the lakes in succession, as the shifting bodies above float across them, exhibit all the varieties of night and day almost at the same instant: the mists interposing their dull yet transparent coverings to the view, raise new desires of a fallen and clearer prospect: and the wandering vapours flitting from cliff to cliff, as if in search of the clouds from which they have been separated, amuse the eye with their varieties and irregular motions.

But "every white will have its black." The clouds and mists at Killarney, like clouds and mists elsewhere, bring with them something more than majesty to the prospect; and occasion other "vicissitudes" than those of light and shade in the face of the landscape. The west of Ireland is remarkable for its rains; and certainly in no part of it is that feature of the climate so prominently developed as at Killarney. Hence arises a serious drawback upon its attractions; or as the writer last quoted says,—

After all this happy spot labours under one disadvantage, and one, too, which I am the more averse to mention, since so celebrated a writer as Dr. Johnson has thought it sufficient in the case of Loch Lomond, to counterbalance so many natural beauties; and this is no other than the immense rains; which fall here more abundantly, and that even in the best seasons for visiting the lake, than in all other parts of the kingdom.

Upon this account a lengthened residence at Killarney is necessary to a full enjoyment of its beauties. The space assigned for the regular performance of the tour is three days,—though, to accommodate all classes, a mode has been devised of "doing it" in two, or even in one day. But, for the ordinary traveller to expect three consecutive fine days under the sky of Killarney, would be scarcely more reasonable than asking for the ocean in the deserts of Africa. Yet to this very drawback upon the attractions of Killarney, we trace those attractions themselves; and instead of complaining, we shall do well to recollect that the limitations here set to our pleasures are necessary to our being pleased at all, that what we at first call a disadvantage is the spring and source of all we admire,—

That the Hyades are here the handmaids of Flora; for that without their perpetual effusions of rain we complain of, the rocks must resign their vegetable inhabitant, the rivers mourn their exhausted urns, and the cascades no longer resound in the dull ear of memory; that the living lake itself must dwindle into an inconsiderable pool, and the mountains stripped of their honours become a dreary waste, the abode of gloom and barrenness.

We have said that the mountains of Glena and Tomies are seated upon the western bank of the Lower Lake. Beyond them, still further to the westward, is a range of other mountains which runs towards the Atlantic, in a direction at right angles to theirs, or in such a manner that if it ran towards the east instead of towards the west, it would cut the lake in half. This range bears the name of Macgillicuddy's Reeks, the appellation of Macgillicuddy being derived, according to the common account, from an old family once flourishing in these parts, and that of Reeks being applied to the mountains because of their sharp jagged peaks. One of these peaks called Carran Tual, or Gheraun Tual, (from some resemblance in it to an "inverted sickle,") is the loftiest summit of all Ireland, measuring 3394 feet.

As the Reeks lie behind the mountains which bound the western bank of the Lower Lake, they are, of course, not to be seen from every point of view; if the spectator be too close they are hidden. From the hills upon the opposite or eastern side of the lake they appear to advantage, towering above the heads of Glena and Tomies. But the best view of them is obtained from the hills upon the northern border of the lake; and this is the view which is represented in our engraving, the spectator being placed on the hill of Aghadoe, close to the ruins of the ancient cathedral of that name. The extensive prospect which this height commands is constantly recommended to the tourist; and certainly it is one of the most remarkable which he will enjoy at Killarney.

From hence (says Smith, the historian of Kerry), is to be seen one of the most delicious landscapes in Ireland, and perhaps few countries in Europe afford better; but this is such a masterpiece, that even the Poussins, Salvator Rosa, or the most eminent painter in that way, might here furnish himself with sufficient matter, not only to form one but several entertaining prospects. From this eminence a survey may be taken of the greatest part of this beautiful lake, and likewise of that stupendous amphitheatre of mountains which are raised along the opposite shores. Towards the south-east stands the mountain called Mangerton, whose feet the lake washes, and whose summit is generally lost in the clouds, it being justly esteemed one of the highest mountains in Ireland*. More towards the centre of the lake is a high mole, called Turk, whose sides, down to the verge of the water, are beautifully clothed with groves of various kinds of trees. One part of this hill slopes away like a promontory terminating in the lake, forming one side of a canal, which is a passage into the Upper Lake, as doth the front of another mountain, called Glena, the other side of this strait, which is adorned also with forest trees. As a fine contrast to this verdure, at the backs of these mountains stand others shaped into pyramids, being only naked rocks of a vast height. The grandeur and magnificence of these mountains, not only entertain and surprise the spectator, but he must be also agreeably amused in contemplating the infinite variety of beautiful colouring they afford. For in this part may be seen the gayest verdure, blended with scarlet fruit and snowy blossoms, well known properties of the *Arbutus;* and in other places the most elegant variety of brown and yellow tints, caused by other kinds of trees and shrubs, appears; all these are intermixed with rock-work, and, to soften the whole, a deep, smooth, and noble basin of water extends itself beneath this scenery; but to give the reader an adequate idea of this place would require the pencil of some excellent painter rather than the pen of any prose writer.

To the west of Glena stands the lofty peak called Tomish, variegated half-way to its top with a waving forest, and down whose sides, especially after rains, run very considerable cataracts into the Great Lake. There are many other hills still running more west, as far as the eye can reach, for many miles; the nearest, and most surprising for their loftiness, are the *Reeks*, already mentioned, whose tops resemble so many pinnacles, or rather spires, lost in the clouds.

Carran Tual being the highest mountain in Ireland,

* When Dr. Smith wrote, Mangerton was generally considered the highest mountain in Ireland, although it is nearly nine hundred feet lower than its close neighbour Carran Tual;—a fact which shows most strikingly how fallacious a guide is the appearance of mountains in estimating even their comparative height.

the ascent to its summit forms a notable exploit with the more active and adventurous of the visiters to Killarney. The excursion, though a fatiguing one, is unattended with danger; and it affords many fine mountain scenes which, even without the extensive prospect from the summit, would be amply sufficient to reward the traveller for the toil of the ascent. Even the lower Reeks are well worth the labour of a visit; Mr. Weld ascended one of them, which the ignorance of his guides led him to mistake for Carran Tual, and he described the scenery which he beheld as sublime in the extreme. The party proceeded first to Dunloh Gap*, and having advanced into it to the distance of half a mile, began to ascend the mountain on their right. It proved extremely difficult of access, and in many parts so steep, that, without the aid of the sapling oaks which spring from their fissures, it would have been impossible to scale the rocks. On the summit of this mountain they found an extensive tract of ground, less encumbered with rocks than the valley below, and covered, as far as the eye could see, with heath and coarse grass, on which innumerable herds of cattle were fed. Beyond it appeared another mountain extremely rugged, which they reached at the end of two hours. The ascent was not steep; but it was laborious and tedious, owing to the immense heaps of loose stones in some places, and in others deep rents, which could not be passed without the utmost caution. Along this part of the route, the only animals they observed were eagles, of which numbers hovered above them as if alarmed at the invasion of their lofty solitudes: at one moment they counted no less than twelve of them within gun-shot.

The craggy tops of the Reeks appeared on reaching the summit of this latter mountain; and after walking for about an hour over a rugged way, nearly similar to that which they had already traversed, they gained one of the loftiest pinnacles, which their guides told them was Carran Tual.

It is scarcely possible (says Mr. Weld), to convey an idea of the sublime view which was now unfolded to our eyes. On each side lay a vast precipice, beyond which arose other immense mountains: still further on we saw the Atlantic Ocean bounding the horizon for a great distance; and in the opposite direction a wide expanse of the inland country, watered by innumerable rivers and lakes, among which that of Killarney was only conspicuous for its superior extent. One of the peaks before us seemed to be considerably more lofty than that which we had ascended; but the guides persisted in assuring us that the appearance was deceptive; and that if from any third station we could compare its elevation with that of the point on which we then stood, the superior height of the latter would be obvious. The intervening precipices were impassable; as it was out of our power, therefore, to make the trial, we were satisfied to receive this intelligence as conviction; and, perhaps, none of us, after so much fatigue, were willing to entertain a doubt of having attained the object of our laborious undertaking.

The mountain here described resembles in shape a wedge; at the summit it presented a long craggy ridge, so narrow, that whilst they stood upon it we could look into the depths of the precipices at either side, or drop pebbles into them from each hand at the same moment. Large masses of rock are often detached from the ridge, through the incessant action of mists and vapours prevailing in these high regions, and especially after the snow begins to dissolve. They roll down the mountain with a loud roar, but fortunately there are no dwellings which they can reach in their descent.

The party descended the mountain by the opposite side, under the full impression that they had scaled its highest peak, and directing their steps towards the Upper Lake, reached a cottage at which they rested.

On recounting the adventures of the day, and boasting of having been on the highest ground in Ireland, an old gray-headed man who stood by expressed some doubt of the fact; adding that if we had really been on the most lofty point of the Reeks, it would have been impossible for us to have returned before night. We appealed to our guides, who, jealous of their reputation, of course confirmed our story; to put this matter beyond doubt, however, the old man requested us to come to the door and point out the mountain we had ascended. The Reeks rose in full view before the cottage, and we could easily trace our route to the most lofty peak. This was sufficient to confirm his first supposition. Gheraun-tuel, he told us, was much higher than any of the other points, and was neither visible from the valley in which we stood, nor from any part of the lake of Killarney. It was to no purpose that the guides maintained the contrary, the evidence of our own senses had already impeached their knowledge, and their ignorance of the country was now proved by the concurrent testimony of several mountaineers. The difficulty of ascending Gheraun-tuel was represented to us as very great, and no stranger, we were told, had ever attempted it. This was but an additional incentive to undertaking the enterprise; and the old man having offered his son as a guide, the next day but one was appointed for the expedition.

There are two routes by which the ascent of Carran Tual is now made. By one of them the traveller proceeds along the northern shore of the Lower Lake to Dunloh Castle, and keeps a straight course beyond it in the same direction, after skirting the northern side of the Reeks for some distance, until he arrives at that part of their base above which towers the object of his search. The other route is by the Upper Lake, whence he enters a valley which leads him to a similar point on the opposite or southern side of the Reeks.

The valley through which the latter route conducts him bears the name of Comme Duff, or the Black Valley; it is watered by a chain of small lakes and a river connecting them together. This valley bears some resemblance to the Gap of Dunloh; but the scenery is much tamer, and is rather to be admired for the delightful verdure of the peaceful and retired meads than for the boldness of the rocks, or the height and abruptness of the impending precipices. After passing into another valley, which branches off from this, and proceeding for a considerable distance, he begins to climb a mountain, which, though steep, is not difficult of ascent; on the summit is a long plain, which forms the body, as it were, of the mountain mass out of which the Reeks rise. At the end of this plain, which is covered with coarse grass, is seen the conical head of Carran Tual. Advancing towards it the traveller has to proceed four or five miles before it discloses itself fully to his view; at length he reaches the brink of a precipice, when a complete view of it opens. Mr. Weld thus describes its appearance:—

It rose with great regularity in the form of a cone, and to appearance stood quite insulated except on the nearest side, where it was connected with the mountain on which we stood by a sort of spur, forming an isthmus, and bearing a resemblance, though on a scale of such great magnitude, to the artificial approach to an old castle. At the height from which we viewed it, this pass did not seem to be wider than might be sufficient for a single carriage; and though on descending we found it at least sixty feet broad, yet the immense depth and great abruptness of the precipices at each side so imposed on the senses, that we could scarcely persuade ourselves of being in perfect safety in its very centre. Here, however, we halted at once to admire the sublimity of the scene, and to take some refreshment and repose. From this place to the summit the distance did not appear to be very great, as the slope, owing to our contiguity to the mountain, was fore-shortened; but though we advanced with ardour and the way, except being very

* For an account of this remarkable defile, see *Saturday Magazine*, Vol. XII. p. 83

steep, was not incommodious, we did not arrive at the top until an hour and a half after we had set out.

The top of the mountain presents a smooth area, nearly circular; it is about thirty feet in diameter, and from every side there is an uniform slope down. The stones are split into small flags, which, in many cases, are also broken crosswise; thus the summit is composed of a species of shingle, which, after a heavy fall of snow, is carried down in considerable quantities in the thaw; for this reason it has been said, that the height of the Reeks has probably diminished in the lapse of time.

From the summit of Carran Tual a most commanding view is obtained. To the north, Dingle Bay, and the whole of the sea-coast between it and the river Shannon; and in the opposite direction, Kenmare River, Bantry Bay, and the other great estuaries in this part of Kerry, are all distinctly spread out. The other rocks appear like so many inclined planes, whose angles of inclination are all equal, so that they appear to lie in parallel strata. On the tops of several are small lakes, like those on Mangerton and other high mountains on the range. The inland view is less interesting than that obtained from others of the Reeks whose height is not so great; few of the lakes can be distinguished, and the beauty and variety of the scenery surrounding them is lost in the immensity of the distance. The spectator gazes with wonder upon the stupendous prospect which is spread around him, but the intense cold prevailing at this lofty elevation, renders unpleasant a stay of any length on the summit of Carran Tual.

The descent from the isthmus or ridge, which connects Carran Tual with the other Reeks, into the valley of Comme Duff, is tedious but not difficult, the steepness of the declivities rendering it exceedingly fatiguing. Mr. Weld, who descended on this side, speaks of his route as somewhat hazardous. He tells us, that shortly after leaving the isthmus, his party were conducted to a precipice, at least sixty feet deep, down which they were told that it was necessary for them to take their course.

The proposal (he says) startled us, nor did we conceive how it was practicable; but the guide seating himself at the brink of it, on a rock which presented an even face nearly to the bottom of the precipice, slid down it, taking the precaution, however, to impede the velocity of the descent, by catching hold of the tufts of long grass which grew from the crevices at each side. This example was followed without hesitation; and having accelerated our descent down the steepest part of the mountain, by sliding over other rocks of a similar description, we soon reached the bottom.

Having reached the valley of Comme Duff, the visiter makes his way, over a rugged and stony path, for the distance of about four miles; when he has reached the banks of the Upper Lake, it is customary to have a boat in waiting, by previous arrangement, to convey him homeward. It will be late before he arrives at the town of Killarney; sixteen or seventeen hours are scarcely sufficient for the whole day's excursion, so that if he have started as early as five in the morning, he will not return much before midnight.

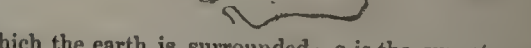
Besides Glena and Tomish there is another mountain adjoining the Reeks, which is deserving of notice. It is connected with that of Glena, and with it forms one side of the Gap of Dunloh, the Reeks forming the other. This mountain is called the Purple Mountain, from the large loose fragments of stone about its summit, the débris of the rugged cliffs of a dark purplish clay-slate, which give to the mountains that hue when viewed from a distance below. From Mr. Barrow's account it seems to be deserving of a visit.

I made the ascent (he says) in about an hour. The day was as fine as ever shone from the heavens; it was one day in a hundred, as the guide remarked, not a cloud to interrupt the view, and the whole range of Macgillicuddy's Reeks, with their peaked and jagged summits lay beautifully before me. The prospect was varied, extensive, and grand. On the west was the silver stream of the Laune, meandering into Dingle Bay, and a little to the left the great cluster of the Iveragh Mountains; on the south-west, the River and Bay of Kenmare; on the south, and close at hand, the rounded and unsightly summit of Mangerton, boasting an elevation of about 2550 feet; and on the east, the grounds and Abbey of Mucruss; but Ross Castle, with its well-planted island, and beyond it the town of Killarney, were from this point hidden from the sight. On the summit of the Purple Mountain a heap of stones was piled up, on which I suppose the officers employed in the Trigonometrical Survey of Ireland had fixed their staffs, as these piles are observable on all the highest points in the island.

TWILIGHT.

In those portions of the globe where the atmosphere is frequently obscured by clouds and mists, and where the nights in some parts of the year greatly exceed the days in length, we enjoy the cheering influence of light for a short time before the sun has actually risen, and again after it has set. This mellow and pleasing light, which we call twilight, arises from the refractive power of the air, by which the rays of the sun are bent from their direct course, and partially illuminate the earth for a limited time after it has set, and before it has risen.

The mode in which this beautiful effect is produced may be illustrated by the following diagram. Let D B C represent part of the circumference of the earth, and the line A P the boundary of the atmosphere by



which the earth is surrounded; S is the sun at some distance below the horizon, that is, out of the sight of an individual placed at B, and consequently a ray of light proceeding in the direction S A E could never reach the earth at B, if it was not for some counteracting cause: this cause we find in the refractive power of the atmosphere. (We have explained the phenomena of refraction in the *Saturday Magazine*, Vol. XI., p. 77.—Amusements of Optics.) The ray of light in its passage towards E meets with the atmosphere of the earth somewhere about A, and is bent from its direct course towards B, so that those who live at B on the earth's surface enjoy the effects of the sun's rays for a considerable time after that luminary would be otherwise out of sight.

Twilight varies in duration at different times of the year, and in various parts of the globe. Between the tropics it is scarcely known, the brilliant nights of these climates rendering it unnecessary; so that the passage from day to night, and from night to day, is almost without an interval. Sir Walter Scott alludes to this in his poem of *Rokeby*, when he puts these words in the mouth of the pirate Bertram Risingham.

> And now, my race of terror run,
> Mine be the eve of tropic sun:
> No pale gradations quench his ray,
> No twilight dews his wrath allay.
> With disk like battle target red,
> He rushes to his burning bed;
> Dyes the wide waves with ruddy light,
> Then sinks at once,—and all is night.

THE USEFUL ARTS. No. XXXIV*.

Masonry.

When the stone is sawed to the proper size, the surfaces which will be exposed to view, are to be made smooth and even. The tools used by the mason for this purpose consist of iron chisels, of different widths, and, principally, of a sharp-pointed one, called a *pointer;* these chisels are struck with a mallet made of a conical-formed lump of hard wood, fixed on a short handle.

The *pointer* is used for chipping off the principal roughnesses on the face and edges, and for working the whole face over to bring it level, the workman trying his work by applying a *straight-edge* occasionally to it. When the front and edges are made *true*, the face is sometimes *tooled* over, so as to leave regular furrows in it, according to certain forms, by which the different kinds of work are distinguished. But this practice is going out of use, now that soft free-stone is so much employed in building. In old edifices, such as St. Paul's, Whitehall, &c., &c., the stone will be found to be wrought on its face in the manner alluded to.

Stones in buildings are not only fixed with mortar, as bricks are, but are further secured in their places by being clamped together with iron clamps. These are short iron bars, from seven to twelve inches long, one and a half wide, and half an inch thick, according to the size of the stone; the ends of the clamps are turned down a little, to afford a better hold. A channel is cut in the two contiguous stones deep enough for the clamp to lie in, and the ends of the channel are sunk deeper, to receive the turned-down ends of the clamp; when this is put into the channel, molten lead is poured in to fill up the interstices, to keep the clamp in its place, and to prevent its rusting by wet getting to it.

From the expense of carrying and working stone, the walls of buildings at a distance from a quarry are seldom, now, built of solid stone, but a facing of this material is applied only on the external surface of the wall, which is built of brick. This kind of work is called *ashler* work, and both the brick and stone-work must be executed with considerable care, to enable a wall composed of two materials to preserve its perpendicularity; it being obvious, that if the brick part yielded to the weight, it must, from its construction, do so more than the stone facing, and, therefore, the wall would bend inwards and become crippled.

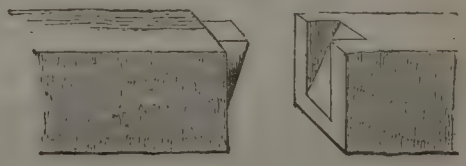
The width of the courses of ashlers must, therefore, be made equal, exactly to a certain number of courses of bricks with the intervening mortar, and the brickwork must be executed with such care, that this number of courses may be everywhere of the same width in the whole height of the wall. In every course of ashler there must be solid stones laid quite, or nearly quite, across the width of the wall, to form a *bond* to the stone facing, and all the stones of the ashler must be fixed with iron cramps to one another and to these bond-stones. But however carefully a faced wall may be executed, it is never so firm or durable as one built entirely of either material; indeed, if well executed, of good materials, and of competent thickness in proportion to its height, a brick-wall is the most durable, light, and efficient structure that can be erected.

When stone is to be cut into cornices, mouldings, &c., the blocks having been sawed, the ends top and bottom are worked very true and parallel, or perpendicular to each other, and one edge or *arris* cut to a perfectly straight line; a thin wooden mould of the section of the cornice is then applied to each end, and the profile of the mouldings marked out on the stone. The workman being guided by this figure, cuts away the stone down to the general surface of the mouldings, and then proceeds to get the flat fillets of the mouldings perfectly staight and true by the rule; these again guide him in working the curved mouldings, such as *ovolos, cavettos, cyma reetas*, and *ogees;* when these are cut nearly to their profile, and perfectly straight on the *bed* line, they are finished off by being rubbed down smooth by thin long straight-edges of stone.

Foliage and carved work is executed by a better kind of workman, possessing some of the taste of an artist, and he works on the same general principles as a sculptor when executing a statue; it would be foreign to the object of these papers, therefore, to dwell on this branch of the mason's art.

It often, or even most commonly occurs, that the distance between two columns of a portico, is of greater length than a stone can be obtained, and if the architrave, or that part of the *entablature* immediately over the capitals of the columns be looked at attentively, a stone will be perceived between the columns apparently unsupported, for neither end rests on the column, and the joints of those ends are upright, not presenting any character of a voussoir-stone or arch. The contrivance by which such an architrave stone is supported deserves to be described.

The stone in question has a projecting part, wrought at each end, of the form shown in the annexed figure; this projection is received into a corresponding cavity, cut in the end of the stone supported by the column, and the joint is thus really an arched or wedge-shaped one, though the bevel line is concealed, and the two stones, when put together, present only a vertical joint.



The mason, in common with the bricklayer, uses *squares, levels, plumb-lines*, and *straight-edges* to set out his work, and trowels and mortar to set the stones with; but the latter is rather used to make the joints water-tight than to keep the stones together, this being effected by their weight or by iron clamping. Formerly the mason required far more accurate and extensive knowledge of geometry than is possessed by persons of the trade at present; this was when he was called on to construct groined and vaulted roofs, enriched with carved work and pendent corbels, where the nicest workmanship was required, to ensure the stability of the light and graceful columns and vaulting of a Gothic cathedral. It was this possession of superior skill and knowledge that caused the establishment of the Society of Free Masons, which dates its rise from the tenth or eleventh century.

Marble, from its costliness, and the difficulty of working it, is seldom, if ever, used in solid pieces in buildings; thin facings of it are set upon stone *backings*, much as rare woods are used in *veneering* by the cabinet-maker. The marble is sawn into thin slabs, like other stone, and the face is polished by rubbing on it the surface of another piece, fine sand, mixed up with water, being used to cause abrasion.

* Continued from Vol. IX., p. 40.

PROCESSES BY WHICH THE EARTH IS CLOTHED WITH PLANTS.

No one can have seen a lake, without observing that wherever a river flows into it, the borders consist of meadows, or of marshy land, or both: while the marsh is a preliminary to the meadow, and is finally converted into one. If the whole process be watched, it will be found to commence in the shoaling of the bottom at the entrance of the river, sometimes producing islands, or banks, which, gradually attaining the level of the water, become first marshy tracts, and are finally elevated so as to form solid plains of meadow land. The progressive deposition of earth and stones by the river is here the fundamental cause: and as far as this acts on that land which has already surmounted the general level of the water, the increase is the result of inundations extending themselves over it. The consequent effects are the narrowing, the shortening, or the dividing of lakes, and ultimately their obliteration, so that nothing at length remains but a river traversing a plain; while the practical and obviously designed result is, in all cases, an acquisition of new and valuable lands. The object here is to point out that portion of the total plan which is effected by the intervention of the living and vegetable creation, through the inclinations, or instincts, of plants appointed for the completion of this great design of clothing the earth.

It is a striking proof of design, that two processes, entirely distinct in their natures, are brought to bear

on the production of one effect: the second being also prepared to follow and complete what had been commenced by the first. It is a further proof of such a regular and fore-ordained plan, that while the general inclinations and structures of the plants destined to this end are peculiar, so is there among them a still further gradation of inclination and structure: a succession of distinct desires and powers, which enable some to commence that portion of the general duty which others are to take up, and others again to terminate, while none of these can perform the office of their associates in the work. In every case, even under the absence of all analogy, we must grant that such a mode of proceeding bespeaks a design: it is impossible to doubt it for a moment, when we find man himself pursuing the same system, and, whether he knows or not that he is imitating nature, sowing vegetation to secure and consolidate the mud which his piers and dams have detained, that he may gain a new territory from the waters.

In the proceedings of nature, however, the plan is more perfect; and while the results are more numerous, the provisions for each are as minute and accurate, as the effects themselves are unfailing. Not only is the new land consolidated, but the plants are constructed with powers to detain what would otherwise have floated on with the stream, to be lost in the ocean; that most valuable portion of the whole deposit, on which the unceasing fertility of these new lands is to depend. And while the living plants serve to detain and to bind, the dead ones are ordained, in their generations, to fertilize, and, still further, to aid in elevating the new plains beyond the eventual inroads of the waters. A short list, selected from a numerous catalogue of plants, will furnish that detailed evidence which the reader can easily verify and extend.

In the sea, it is the Zostera chiefly, which, with its long, numerous, and firm roots, lays the first foundation of that which will afterwards become a salt-marsh; acting beneath the water, like those far different plants which consolidate the dry sands of the adjoining shores. In fresh-water lakes the Scirpus ocicularis, Subularia aquatica, and others, perform the same initial duty: and when we find that all these plants have been created to live and to propagate entirely under water, we cannot doubt that they were appointed to the very office which they execute so well. But in fresh waters, if not, with us at least, correspondently, in the sea, the detension and consolidation of earthy matters are effected by many more plants, not purely subaqueous; but of an amphibious nature. These root beneath the water, but grow above it; acting by means of their stems and their crowded growth, in detaining what their roots consolidate, or checking that action of the waves which would diffuse the earths along the bottom, and retard the desired effect. Such are the bulrush and the common reed. The student of nature should examine for himself the various plants, Nymphœas, Charas, Hottonia, Butomus, &c., which take their shares in this useful work. But it is most important to remark that there is some one, or more, adapted to every possible situation and circumstance under which this work may be carried on. Thus have structures and inclinations been provided, not merely for the sea and for fresh water, but for every variety of each: for the pure ocean, and the brackish æstuary of a river, for the clear lake, the rapid river, the alpine pool, the heated pond, and the foul and stagnant ditch. The Scirpus maritmus and the Ruppia thrive where the bulrush and the Potamogetons could not exist: the Lemna does its best to reclaim that pond which would bear no other plant: the Lobelia shuns the poisonous ditch which the Hydrocharis prefers, and the Ranunculus aquatilis, appointed to this duty in that shallow pool which the first heats of Summer evaporate, is equally content to live beneath the water, and on the dry land; amply provided with means, as with inclinations, for each mode of life. But he who would scan the whole of this great design, must investigate all this; while, if he would see, under one striking view, what the Author of nature effects in this manner, he must not confine himself to the rivers or the lakes, the marshes or the coasts of our own country, but turn the eye of botany and geography on the singularly rooted mangroves, the gigantic reeds, and other uncounted plants, which cover the swamps of the torrid climates, and are daily converting unnumbered miles of sea, and river, and lake, into habitable land. He will not doubt the ultimate value of the result, when he finds the marshy woods of Borneo, occupying hundreds of square miles, all gained from the ocean by the labours of the vegetable world.

The plants, however, which had performed the work thus far, can do no more when once the new land has surmounted the surface of the water. A new set therefore has been appointed to carry it on to its completion. The Salicornia, Arenaria, &c., perform, on the sea shores, that for which there are provided, near fresh waters, marsh plants beyond numbering, including even trees, like the willows with us, and the palms in hot countries, which aid in the great work. Thus does the marsh at length become a plain, fitted for pasturage or agriculture, or demanding only the further labours of him for whose use it was rescued from the waters. The last race has deserted it, as preceding ones had abandoned what they had produced: yet each is still performing its appointed duties: and, if excluding itself by its own actions when it could no longer be useful, continuing to prepare a new place for its successors, to surrender it again when it has executed the will of Him, of whom it is the blind but obedient agent.

An analogous but different proceeding must here be noted, independently of water. This consists, fundamentally, in the deposition of sand on sea shores; the winds performing, in this case, what the water does in the other. And however injurious the consequences may occasionally be, in the overwhelming of fertile lands, I have little doubt that the general results are beneficial, as that the whole was designed. Mankind is ever more ready to complain of injuries than to be thankful for advantages.

If this sand is not universally calcareous, it is such far most commonly: while, as the produce of sea shells, the levity of the fragments allows this kind, at least, to be most widely dispersed, so as to become calcareous manure to places within its reach, and thus producing valuable collateral effects, in addition to the accession of territory thus gained from the bottom of the sea.

Here, as in the case of deposits from water, the prime object was consolidation, that the winds might not destroy what they had produced; and the second was to induce a more fertile surface, by the addition of vegetable matter. And both are accomplished by the same means, through a special creation of plants, provided with inclinations to occupy those places, and powers to effect these purposes. All of them are willing to grow in sand and some will grow nowhere else; while the others, equally prospering on the incipient pasture, form the connecting link through which it is to be completed. Here alone we see the proofs of design; but no doubt can remain

when we examine the long roots of these plants, tenacious as they are numerous, and intersecting the sand in every direction, as if the root, rather than the plant, was the contrivance and the object, and thus rendering it a firm mass.

Among these, on our own shores, the Elymus, Triticum, Arundo, and Carex of the sand, are the most familiar, as they are the pioneers in this great work; but few can be unacquainted with the Convolvulus, Bunias, and Euphorbias, of the sea shores, with the Eryngo, the Matthiola, the Kali, &c.: while, knowing the general desires of plants for soil and water, we might wonder at a choice so apparently unreasonable, did we not know by whom that choice was directed.

Though the chemical powers of nature convert the rock into soil, that operation is often slow. There are situations also where soil cannot rest; or else it becomes removed, from the flow of water. Here it is, that the vegetable agents are ordained to act, as here they are made to inhabit; and from this point their actions are most easily traced. And when we find that a specific family of plants, utterly unlike all others, in their instincts or affections, as in their nature, their structure, and their powers, execute this prime office, surrendering their places afterwards to a second, scarcely less remarkable in these respects, yet approaching nearer to the general vegetable world; as they are also the immediate precursors of those more perfect and more widely useful plants, we cannot for an instant doubt the design. It is in the multitudinous and incomprehensible tribe of lichens and analogous plants, that we find these pioneers of vegetation, seeking their places where no others could exist; demanding no water, requiring no soil; rootless, leafless, flowerless, if not seedless, perpetuated we know not how, unsusceptible of injury short of destruction, and, if not immortal, tenacious of life as are the seeds of plants themselves, and capable of almost equal dormancy. What their anatomy is, no one has ascertained; and if they do produce seeds to be spread by the winds, we have still to explain how that which must be lighter than the winds themselves, and which the microscope cannot discover, should adhere to the solid rock.

But the Creator has only to will, and it is done: nor can we contemplate this extraordinary form of vegetable life, without reflecting on the power which has given that life to such an organization, so unlike to almost all else, yet so perfectly adapted to the purposes which it was created and commanded to serve. And if the species are so numerous that they are yet uncounted, so are there kinds allotted for different qualities of rock, and for different surfaces; for the calcareous and the flinty, for the smooth and the rough, for the precipice, or the wall, or the bark of a tree. Thus also are there individuals appointed for the damp and dark forest, the sunny and arid cliff, the frozen Alpine summit, and the salt sea shore, the climate of Bengal, and the snows of Greenland.

It is a general law for plants that water is essential to their existence, and that deprived of this, once dried, they are irrecoverably dead; though many have been enabled to retain it with almost miraculous obstinacy under the most unfavourable circumstances. But had this law involved the lichens, it would have been fatal to their appointed duties; while their bulk and structure are commonly such as to have rendered the retention of moisture impossible. Exposed to a burning sun, on naked rocks, and without the means of resisting its influence, they are often so dried as to crumble at a touch: while this condition is sometimes of daily occurrence. Their very races might have been exterminated; but the Creator never leaves his work imperfect. He has made an exception to the general law: the principle of life is not withdrawn, and they are ready to revive and resume their functions at the slightest return of moisture.

In whatever way the foliaceous and the shrubby lichens may assist, the result is to lay the foundation of a soil on the naked rock, partly through their own living structures, partly through their decomposition, and partly through the flying particles of earth which they detain. But the soil thus produced is unfitted to give a hold or a place to the larger and more perfect vegetables. A new tribe of plants, of a higher organization than their precursors, yet inferior to those which are to follow, has been created for this end. These are the mosses, and their variety resembles that of the lichens. These have scarcely the power of rooting themselves on a naked surface, if we except the barks of trees; but they attach themselves readily to the least quantity of soil, as formed and collected by the lichens: and that they execute the office of forming additional soil, the least observation will show.

Their office being at length performed, there is room and lodgment afforded for plants of greater bulk and more perfect structure; and he who examines the summit of a wall where the grasses, the Arabis Tunitis, Sedum, &c. are rooted in their mossy cushions, will see those plants which are destined to replace their immediate predecessors, still adding to that soil which may one day bear the trees of the forest.

Let him who reads or observes never forget that in all this, as in everything else, there is nothing casual, nothing purposeless, nothing undesigned: that good ends have been intended, as good purposes have been effected; and that all creation everywhere presents to him who will examine it, the most incontrovertible proofs of a Great Artist, intending, designing; perfect in wisdom, and absolute in power.

[Abridged from Macculloch's *Proofs and Illustrations of the Attributes of God.*]

TO A WATERFOWL.

Whither 'midst falling dew,
While glow the heavens with the last steps of day,
Far through their rosy depths, dost thou pursue
Thy solitary way?

Vainly the fowler's eye
Might mark thy distant flight to do thee wrong,
As, darkly painted on the crimson sky
Thy figure floats along.

Seek'st thou the plashy brink
Of weedy lake, or maze of river wide,
Or where the rocking billows rise and sink
On the chafed ocean-side?

There is a Power whose care
Teaches thy way along that pathless coast
The desert and illimitable air,
Lone wandering, but not lost.

All day thy wings have fanned,
At that far height, the cold thin atmosphere!
Yet stoop not, weary, to the welcome land,
Though the dark night is near.

And soon that toil shall end,
Soon shalt thou find a Summer-home, and rest,
And scream among thy fellows: reeds shall bend
Soon o'er thy sheltered nest.

Thou'rt gone, the abyss of heaven
Hath swallowed up thy form; yet, on my heart,
Deeply hath sunk the lesson thou hast given,
And shall not soon depart.

He, who from zone to zone,
Guides through the boundless sky thy certain flight,
In the long way that I must tread alone,
Will lead my steps aright.—Bryant.

NOTES ON FOREST TREES. No. XXII.

The Mangrove, (*Rhizophora manglier.*)

The trees of this tribe are peculiar to the shores of the oceans and large rivers of the tropics, where they form dense forests, reaching almost to the waters. The Mangrove is a tree about fifty feet in hight, and its mode of growth is very singular, resembling that of the banian, or Indian fig. The tree is only found in marshy places: its branches, after growing for some time in the usual manner, suddenly bend downwards and grow towards the earth; as soon as they reach the moist soil, they take root, and thus each branch forms a stem capable of supporting itself without dependence on the parent tree; in this manner one tree will, in course of time, form a complete grove. The forests thus formed by an assemblage of Mangrove trees are almost impenetrable, and in addition to the difficulties offered by the thickness of their growth, their recesses are the favourite haunts of myriads of musquitoes, sufficient to deter the most enduring from the attempt to explore them. An innumerable quantity of birds, chiefly aquatic, take shelter under their branches, while the shallow pools which abound among them form the lurking places of thousands of crabs and of aquatic insects. These amphibious forests are at times inundated by the sea, and on the retreat of the water, numerous oysters and other shell-fish are found adhering to the trees. So that, although the difficulty of penetrating these thick shades is very great, the enterprising sportsman is tolerably sure of being well rewarded for the dangers he has to undergo by an abundance of game.

A singular fact is attached to the history of the Mangrove, namely, the germination of the seeds while they are yet attached to the branches of the tree; these afterwards fall and take root in the ground.

The wood of the Mangrove is good for little else than fuel, but the bark and the seed-vessels are used in tanning hides and in dyeing black.

There are as many as four or five species of the Mangrove, whose native countries are the warmer parts of the New World, and the coast of Malabar in the East Indies.

The regard to the general rules of morality is what is properly called a sense of duty; a principal of the greatest consequence in human life, and the only principle by which the bulk of mankind are capable of directing their actions. There is scarce any man who, by discipline, education, and example, may not be impressed with a regard to these general rules of conduct, as to act upon almost every occasion with tolerable decency, and through the whole of his life, avoid a tolerable degree of blame. Without this sacred regard to the general rules of morality, there is no man whose conduct can be much depended upon. It is this which constitutes the most essential difference between a man of principle and honour, and a worthless fellow. The one adheres on all occasions, steadily and resolutely to his maxims, and preserves through the whole of his life, one even tenour of conduct. The other acts variously and accidentally, as humour, inclination, or interest, chance to be uppermost.—Adam Smith.

The willow which bends to the tempest, often escapes better than the oak which resists it; and so, in great calamities, it sometimes happens, that light and frivolous spirits recover their elasticity and presence of mind sooner than those of a loftier character.—Sir Walter Scott.

Youth is the time of enterprise and hope; having yet no occasion of comparing our force with any opposing power, we naturally form presumptions in our own favour, and imagine that obstruction and impediment will give way before us. The first repulses rather inflame vehemence than teach prudence; a brave and generous mind is long before it suspects its own weakness, or submits to sap the difficulties which it expected to subdue by storm. Before disappointments have enforced the dictates of philosophy, we believe it in our power to shorten the interval between the first cause and the last effect; we laugh at the timorous delays of brooding industry, and fancy that by increasing the fire we can, at pleasure, accelerate the projection.—Johnson.

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QUEEN ELIZABETH; HER PROGRESSES AND PUBLIC PROCESSIONS. No. V.

WOODSTOCK CASTLE IN 1714.

CONFINEMENT OF THE PRINCESS ELIZABETH IN THE TOWER—HER REMOVAL TO WOODSTOCK.

In our last paper upon this subject we related how, immediately upon the breaking out of Sir Thomas Wyat's rebellion in February, 1554, the Princess Elizabeth was arrested in her house at Ashridge, by the orders of Queen Mary, and brought up to London with as much speed as was compatible with her delicate state of health. When the princess reached Whitehall, she was shut up a close prisoner, under the charge of the chamberlain and vice-chamberlain, without being permitted to hold communication with any one, for nearly a fortnight. On the Friday before Palm-Sunday, Gardiner, the Bishop of Winchester, and nineteen others of the council, came from the Queen, and charged her with being privy to Wyat's conspiracy, alleging that she was concerned with the Carews, and other gentlemen in the west. The princess positively denied the accusation, and steadily asserted her innocence; but her visitors informed her that it was the Queen's will and pleasure that she should go to the Tower, while the matter underwent examination. Elizabeth was terrified at the idea of being sent to so "notorious and doleful a place;" she again asserted her innocence, and desired the councillors to intercede with her sister on her behalf. But they assured her that there was no remedy, and departed.

About an hour afterwards, the Lord Treasurer, the Bishop of Winchester, the Lord Steward, and the Earl of Sussex, entered with a guard, and removed all the servants of Elizabeth, substituting others of the Queen's; and there were stationed "an hundred of Northern soldiers in white coats, watching and warding about the garden all that night; a great fire being made in the midst of the hall, and two certain lords watching there also, with their band and company."

Upon Saturday following, (says Holinshed, that is on the next day,) two lords of the council, (the one was the Earl of Sussex, the other shall be nameless,) came and certified her grace that forthwith she must go unto the Tower, the barge being prepared for her, and the tide now ready which tarrieth for nobody. In heavy mood, her Grace requested the lords that she might tarry another tide, trusting that the next would be better and more comfortable. But one of the lords replied that neither tide nor time was to be delaied. And when her Grace requested that she might be suffered to write to the Queen's Majesty, he answered that he durst not permit that: adding, that in his judgment, it would rather hurt than profit her Grace in so doing. But the other lord, more courteous and favourable, (who was the Earl of Sussex,) kneeling down, said she should have liberty to write, and as a true man, he

would deliver it to the Queen's Highness, and bring an answer of the same whatsoever came thereof. Whereupon she wrote the following letter:—

To the Queen.

If any ever did try this olde saynge, that a kinge's worde was more than another man's othe, I most humbly beseche your Majesty to verefie it in me, and to remember your last promis and my last demande, that I be not condemned without answer and due profe; wiche it seems that now I am, for that without cause provid I am by your Counsel frome you commanded to go unto the Tower; a place more wonted for a false traitor than a true subject. Wiche, thogth I knowe I deserve it not, yet in the face of al this realme aperes that it is provid; wiche I pray God I may dy the shamefullist dethe that ever any died, afore I may mene any suche thinge: and to this present hower I protest afor God, (who shal juge my trueth whatsoever malice shal devis,) that I never practised, consiled, nor consented to any thinge that migth be prejudicial to your Person any way, or daungerous to the State by any mene. And therfor I humbly beseche your Majestie to let me answer afore your selfe, and not suffer me to trust to your Counselors; yea and that afore I go to the Tower, if it be possible; if not afore I be further condemned. Howbeit, I trust assuredly, your Highnes wyl give me leve to do it afor I go; for that thus shamfully I may not be cried out on as now I shal be; yea, and without cause. Let consciens move your Hithness to take some bettar way with me than to make me be condemned in al men's sigth afor my desert knowen. Also I most humbly beseche your Higthness to pardon this my boldnes, wiche innocency procures me to do togither with hope of your natural kindnes: wiche I trust wyl not se me cast away without desert; wiche what it is I wold desire no more of God but that you truly knewe, Wiche thinge I thinke and beleve you shal never by report knowe, unless by yourselfe you here. I have harde in my time of many cast away, for want of comminge to the presence of their Prince: and in late days I harde my Lorde of Sommerset say, that if his brother had bine sufferd to speke with him he had never sufferd; but the perswasions wer made to him so gret that he was brogth in belefe that he could not live safely if the Admiral lived; and that made him give his consent to his dethe. Thogth thes parsons are not to be compared to your Majestie, yet I pray God, as ivel perswations perswade not one sistar again the other; and al for that the have harde false report and not harkene to the trueth knowin. Therfor ons again kniling with humbleness of my hart, bicause I am not sufferd to bow the knees of my body, I humbly crave to speke with your Higthnis: wiche I wolde not be so bold to desier if I knewe not my self most clere as I knowe my selfe most tru. And as for the traitor Wiat, he migth paravantur writ me a lettar; but on my faithe I never receved any from him. And as for the copie of my lettar sent to the Frenche kinge, I pray God confounde me eternally if ever I sent him worde, message, token, or lettar by any menes; and to this my truith I will stande in to my dethe.

Your Highnes most faithful subject
that hathe bien from the begin-
ninge and wylbe to my ende,
Elizabeth.

I humbly crave but only one
worde of answer from your selfe.

The princess was taken to the Tower on the following day. As that happened to be Palm Sunday, an order was issued throughout London, with the view of enabling her removal to be effected with more privacy, that every one should keep his church and carry his palm. Besides the two lords and the guards, there went with her three of the queen's gentlewomen, three of her own, her gentleman usher, and two grooms of her chamber. In passing London Bridge the whole party narrowly escaped with their lives, in consequence of the great fall of the water. On reaching the Tower the barge was directed to the dismal entrance, known by the name of the Traitor's Gate. Elizabeth felt strongly the indignity thus put upon her, and would have refused to land, but that one of the lords, whose name Holinshed has withheld, plainly told her that she should not choose. It rained at the time, and the same lord offered her his cloak, but, "putting it back with her hand with a good dash," she stepped forth, and as she set her foot upon the stair exclaimed, "Here landeth as true a subject, being a prisoner, as ever landed at these stairs, and before thee, O God, I speak it, having none other friend than thee."

On entering within the building, she expressed her surprise at finding the guards and warders drawn out in order; and being informed that it was the custom on the reception of prisoners, she desired that if it were so, for her cause they might be dismissed; "whereat the poor men kneeled down, and with one voice prayed God to preserve her, for which, on the next day they were all discharged." Proceeding a short distance she sat down on a stone and there rested herself. The lieutenant pressed her to rise out of the rain, but she answered, "Better sit here than in a worse place, for God knoweth whither you will bring me;" and turning to her gentleman usher, who was weeping, she rebuked him, saying, "You ought rather to comfort than dismay me, especially for that I know my truth to be such, that no man shall have cause to weep for my sake." She then arose and was conducted to her prison.

Elizabeth's imprisonment in the Tower was of the most rigorous description. After she had been for some time closely confined, permission was granted, through the intercession of Lord Chandos, the lieutenant of the Tower, for her to walk in the queen's lodgings, in the presence, however, of the constable, the lieutenant, and three of the queen's ladies, and on condition that the windows should be shut. She was then indulged with walking in the queen's garden, for the sake of fresh air, but the shutters of all the windows which looked towards the garden were ordered to be kept close.

About the end of May Elizabeth was removed from the Tower, under the command of Sir Henry Bedingfield and Lord Williams of Thame, to the royal manor or palace at Woodstock. "The xx daye of May," says an old chronicle, "my lady Elizabeth, the queene's sister, came out of the Tower, and toke her barge at the lower wharffe, and so to Richmond, and from thens unto Wyndsor, and so to Wodstoke." It was at Richmond that the princess rested the first night of her journey; she was there watched carefully by the soldiers, her own private attendants being prevented from having access to her. These measures of severity led the princess to suppose, that orders had been given to put her to death privately, when she called her servants together to take leave, she desired them to pray for her, "For this night," she added, "I think I must die." The servants broke into tears and lamentations, and the gentleman usher went down to the Lord Williams in the court, desiring him unfeignedly to show whether his lady and mistress that night were in danger of death, whereby himself and fellows might take such part as God would appoint. "Marry, God forbid," exclaimed Lord Williams, "that any such wickedness should be intended, which rather than it should be wrought, I and my men will die at her feet." On the second day she reached Windsor, where she was lodged in the dean's house, near St. George's Collegiate Chapel. She then passed to Lord Williams's seat at Ricot, in Oxfordshire, where she was "verie princelie entertained, both of knights and ladies."

On arriving at Woodstock Elizabeth was lodged in the gatehouse of the palace, in an apartment which remained complete in the early part of the last century, with its original arched roof of Irish oak, curiously carved, and painted blue, with sprinklings

of gold ornaments, and which to the last retained the name of its illustrious captive. Holinshed mentions three lines which the princess wrote with a diamond on the glass of her window:—

Much suspected by me,
Nothing proved can be,
Quoth ELIZABETH, prisoner.

The German, Hentzner, who travelled in England in 1598, has recorded a sonnet, written by her with a piece of charcoal on a window-shutter, to the following effect:—

O, Fortune! how thy restless wavering state,
Hath fraught with cares my troubled wit!
Witness this present prison, whither fate
Hath borne me, and the joys I quit.
Thou causedest the guilty to be loosed
From bands, wherewith are innocents enclosed;
Causing the guiltless to be strait reserved,
And freeing those that death had well deserved;
But by her envy can be nothing wrought,
So God send to my foes all they have thought.
A.D. MDLV. ELIZABETH, Prisoner.

In the Bodleian Library there is an English translation of St. Paul's Epistles, printed in the black letter, which the Princess Elizabeth used during her confinement at Woodstock; and on a blank leaf is the following paragraph, written with her own hand, and in the style characteristic of the age:—"I walke many times into the pleasant fieldes of the Holye Scriptures, where I plucke up the goodliesome herbs of sentences by pruning, eate them by reading, chawe them by musing, and laie them up at length in the hie seate of memorie by gathering them together; that so having tasted the sweetness I maye the lesse perceave the bitterness of this miserable life." The covers of this book are of black silk, and the princess had amused herself with curiously working, or embossing, various devices and Latin inscriptions in gold twist.

Elizabeth was strictly guarded during her stay at Woodstock, though she was sometimes allowed to walk in the gardens of the palace. In this situation it is "no marvell," to use the words of Holinshed, "if the hearing upon a time out of her garden at Woodstocke, a certain milkmaide singing pleasantlie, wished herself to be a milkmaide as she was, saying that her case was better and life merrier." A fire broke out during the princess's imprisonment in the room under her room; it was promptly extinguished, and seems to have been the result of accident.

At a very early period Woodstock was a royal residence, and as late as the reign of Charles the First, all our kings were in the habit of occasionally taking up their abode here. The palace, or manor-house, was besieged by the Parliamentarians in the grand rebellion; and after being stoutly defended for some time by an officer of great skill and devoted loyalty, it sustained much damage, and was surrendered by commissioners from the king. In 1649 commissioners were assembled here by order of the Rump Parliament, for the purpose of surveying the royal property. They made the king's bedchamber their kitchen, the council-hall they converted into a brewhouse, and in the dining-room they collected, for the use of their fires, logs sawn from a noble tree, which had long flourished in the park under the name of the *King's Oak*.

But their triumph was soon interrupted by circumstances which filled that credulous age with wonder, and afforded an apt subject of laughter to the era which succeeded. Frightful noises assailed their ears in the night; dreadful phantasms glided before their eyes; nor were their sight and hearing alone rendered subject to terrific visitations; many round blows were given; their bed-clothes were torn in fragments, and sundry noxious ingredients were discharged on their amazed foreheads. The populace dignified the nocturnal operator with the name of the *Just Devil of Woodstock*. It afterwards appeared that the whole was contrived by the ingenuity of an adroit and humourous royalist, named *Joe Collins*, who had procured the situation of secretary to the commissioners, for the purpose of imposing on their credulity. When the jest was discovered, Collins was styled the *Merry Devil of Woodstock*.

The furniture was soon afterwards sold, and the buildings portioned by Cromwell or his agents, among three persons. Two of these about 1652, pulled down their portions for the sake of the stone; the portion of the third, which consisted of the gate-house in which the Princess Elizabeth was imprisoned, and some adjoining ruinous buildings was left standing. At a subsequent period this gatehouse was converted into a dwelling, by John Lord Lovelace, who was captain of the band of pensioners to William the Third; and here that nobleman resided for many years. The adjoining ruins were standing sometime afterwards; and there were persons living towards the close of the last century, who could remember a noble porch and some walls of the hall, the walls and magnificent windows of the chapel, several turrets at proper distances, and who could trace out many of the apartments. While Blenheim palace was building, Sir John Vanbrugh laid out 2000*l.* in keeping up the ruins of Woodstock. But the Lord Treasurer Godolphin afterwards observing to Sarah the Duchess of Marlborough, that a pile of ruins in the front of so fine a seat was an unseemly object, all the old buildings, including the Princess Elizabeth's gatehouse, were entirely demolished and removed. Our engraving contains a view of the "Princess Elizabeth's Chamber," and its adjoining ruins, originally taken in 1714, a few years before their destruction.

CONNEXION BETWEEN THE SOUL AND BODY.

SCARCELY can I conceive even to myself, this union between my body and my soul. How is it that I bear upon me the stamp of the Divinity, and that at the same time I grovel in the dust? Is my body in health, it wars against me. Is it sick, I languish with it in sympathy. It is at once a companion that I love, and an enemy that I dread. It is a prison, that frightens me, a partner with whom I dwell. If I weaken it by excess, I become incapable of anything noble; if I indulge it, or treat it with too much consideration, it revolts, and my slave escapes me. It fastens me to the earth by ties I cannot break; and prevents me from taking my upward flight to God for which end alone I was created. It is an enemy that I love, a treacherous friend whom it is my duty to distrust. To fear and yet to love! At once what union and what discord! For what end, with what secret motive, is it that man has been thus organized? Is it not that God has seen it fit by this means to humble our pride, which may otherwise have carried us to the height of disdaining even our Creator, in the thought that being derived from the same fount of being, we might be permitted to regard ourselves as on terms of equality with Him? It is then to recall us incessantly to the sense of our entire dependence on him, that God has reduced our bodies to this state of frailty, which exposes it to perpetual combats; balancing our nobleness by our baseness; holding us in suspense between death and immortality, according to the affection which inclines us to the body or the soul; so that, if the excellences of our souls should inspire us with pride, the imperfections inseparable from our bodies may bring us back to humility.—St. GREGORY; *Book of the Fathers*.

ILLUSTRATIONS OF THE BIBLE FROM THE MONUMENTS OF ANTIQUITY.

No. XII.

The Exodus.

The destruction of all the firstborn of Egypt was so fearful a visitation, that the wicked Pharaoh no longer dared to brave the rightful anger of the Omnipotent, and he gave a reluctant consent to the departure of the children of Israel. There are some circumstances in the account of the preparations which the chosen people made for their perilous journey requiring a brief comment, and we shall therefore make an extract from the sacred narrative.

And it came to pass, that at midnight the Lord smote all the firstborn in the land of Egypt, from the firstborn of Pharaoh that sat on his throne unto the firstborn of the captive that *was* in the dungeon; and all the firstborn of cattle. And Pharaoh rose up in the night, he, and all his servants, and all the Egyptians; and there was a great cry in Egypt; for *there was* not a house where *there was* not one dead. And he called for Moses and Aaron by night, and said, Rise up, *and* get you forth from among my people, both ye and the children of Israel; and go, serve the Lord, as ye have said. Also take your flocks and your herds, as ye have said, and be gone; and bless me also. And the Egyptians were urgent upon the people, that they might send them out of the land in haste; for they said, We *be* all dead *men*. And the people took their dough before it was leavened, their kneadingtroughs being bound up in their clothes upon their shoulders. And the children of Israel did according to the word of Moses; and they borrowed of the Egyptians jewels of silver, and jewels of gold, and raiment: And the Lord gave the people favour in the sight of the Egyptians, so that they lent unto them *such things as they required*. (Exodus xii. 29—36.)

In this passage we must first remark that the destruction of the firstborn took place at a time when the Egyptians were buried in sleep, for it appears from the monuments that they went early to repose, at least we can discover no representations of lamps or candles, nor are fragments of lamps among the articles of Egyptian pottery, discovered in the ruins of their cities in anything like the abundance in which they are found at Herculaneum and Pompeii. This must have added awfully to the terrors of the miracle, and it is no wonder that Pharaoh in the midst of darkness, desolation, and death, should have hurried away those whom he regarded as the source of so fearful a visitation.

It is mentioned that among the sufferers was "the firstborn of the captive in the dungeon;" although there is no distinct representation of a prison on any of the Egyptian monuments which have been yet discovered, there can be doubt that women and children shared the captivity of their husbands and fathers; we find them driven like herds of cattle to the slave-market, led as memorials of victory in triumphal processions, and forced to bear a part in the onerous labours imposed upon slaves. In the East at the present day, women and children continue subject to the calamities of war; in the revolutions of Persia, during the last century, many ladies of exalted rank might say in the sad words of the prophet, "They that did feed delicately are desolate in the streets: they that were brought up in scarlet embrace dunghills." (Lam. iv. 5.) There is no improbability therefore in the statement of the tenth plague having aggravated the miseries even of the prison-house, and swept away the firstborn of the captive, as well as the firstborn of the king. And as we have shown in preceding sections of this series, that the reigning Pharaoh was most probably a foreign intruder, it is not difficult to believe that the amount of captives in the Egyptian dungeons must have been very considerable.

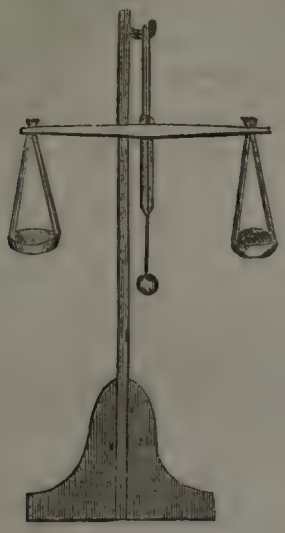
So great was the anxiety of the Egyptians to get rid of the Israelites, that they would not permit them to bake their provisions, but compelled them to take the dough in their kneadingtroughs. We have shown in a former section, that baked meats and confectionary constituted the greater part of the food of the Egyptian people, and consequently the kneadingtrough was an important article of furniture. It was probably made of metal, like that depicted in the accompanying engraving, and could be applied to a variety of useful purposes. In the present instance

CONFECTIONERS PREPARING SWEETMEATS.

the two figures are engaged in the manufacture of piped sweetmeats, not unlike maccaroni both in shape and consistency, which is at the present day a favourite luxury with the natives of Hindústan. It seems probable that the preparation of these and similar sweetmeats, was one of the tasks imposed upon the Hebrews during their bondage in Egypt; for we learn from the book of Samuel, that the preparation of these confections was looked upon as a degrading toil, and among the evils which the prophet predicts to the people from their determination to elect a king, we find this circumstance put very prominently forward. "And he will take your daughters to be confectionaries, and to be cooks, and to be bakers." (1 Sam. viii. 13.)

Our translation states that the Hebrews *borrowed* jewels of silver, and jewels of gold, from the Egyptians, by the direction of Moses, and thus seems to cast an imputation of dishonesty on the transaction which is far from being warranted by the original text. In the first place, the verb *shaal* signifies not *to borrow*, but *to demand*, and secondly, the word *kelím* signifies not *jewels*, but *vessels* or *implements*. The plain meaning of the passage then is, that the Israelites demanded payment of the wages due to them for their labours, and as these were considerable, the amount paid must have exhausted the immediate resources of the Egyptians. There is nothing that more excites astonishment in viewing the monuments, than the vast amount of gold and silver plate displayed on the sideboards and in the palaces of the Egyptians, and it is not improbable that before the use of coinage became common, such vases were sometimes employed as a medium of exchange. But the monuments suggest to us another meaning of the word *kelím*; they show us that the Egyptians in the early ages used ring-money, that is, bullion made up in the shape of annulets like the bangles worn by the Hindús, which are frequently used for money in India. Indeed, in consequence of bullion circulating in this shape, we find that balances were erected for weighing money, and assay-masters appointed to determine the purity of the vessel in all the principal market-places. And this custom prevailed in

Judea so late as the time of the prophet Jeremiah, for we find him recording the circumstances of a remarkable bargain and sale.



ANCIENT EGYPTIAN BALANCE.

Hanameel, mine uncle's son, came to me in the court of the prison, according to the word of the Lord, and said unto me, Buy my field, I pray thee, that is in Anathoth, which is in the country of Benjamin: for the right of inheritance is thine, and the redemption is thine; buy it for thyself. Then I knew that this was the work of the Lord. And I bought the field of Hanameel my uncle's son, that was in Anathoth, and weighed him the money, even seventeen shekels of silver. And I subscribed the evidence, and sealed it, and took witnesses, and weighed him the money in the balances. (Jeremiah xxxii. 8—10.

Bangles, or ring-money, are still employed as a medium of exchange in India and the interior of Africa; very little attention is paid to the beauty of their manufacture, and hence they might well be called *kelim* by the sacred historians, for that word is properly applied to articles coarsely made for ordinary use, but never, we believe, to anything like ornamental work. It appears from what we have said, that the transaction which has so often furnished materials for revilings and objections, to those who "sit in the seat of the scornful," was a mere act of equity, a demand of what was justly due.

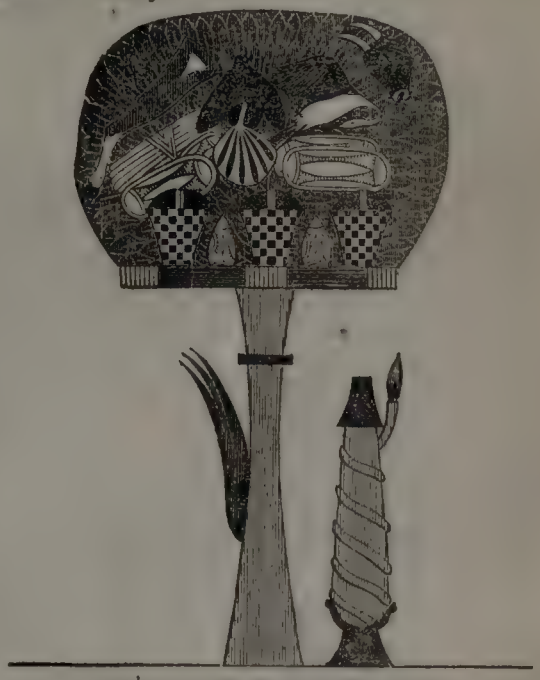
The passover was strictly a Hebrew institution, and we cannot expect to find any illustration of it, save very indirectly on the Egyptian monuments; we may, however, see that the directions given respecting the manner in which it was to be eaten, are directly the reverse of the habits which were adopted at meals in the valley of the Nile.

And thus shall ye eat it; with your loins girded, your shoes on your feet, and your staff in your hand; and ye shall eat it in haste: it is the Lord's passover. (Ex. xii. 11.)

The Egyptians were particularly formal at their dinners, which always commenced at noon, and a great variety of viands were displayed at their tables. So very formal were they at these entertainments, that we find dresses provided for the guests, a custom which had not fallen into disuse so late as the coming of Christ, as we learn from the parable of the marriage of the king's son.

And when the king came in to see the guests, he saw there a man which had not on a wedding garment: And he said unto him, Friend, how camest thou in hither not having a wedding garment? And he was speechless. Then said the king to the servants, Bind him hand and foot, and take him away. (Matt. xxii. 11—13.)

There was no excuse for the disrespect shown, as proper vestments were provided by the giver of the feast. But all the circumstances attending the eating of the Paschal Lamb, were designed to mark urgency and haste. Instead of being divided into joints, and served up with variety of cookery, it was to be roasted whole; its only accompaniment was to be bitter herbs, for it was not an entertainment of luxury, but an acknowledgment of deliverance from the most cruel servitude recorded in the annals of history.



BIRD'S-EYE VIEW OF AN EGYPTIAN TABLE.

The next circumstance to which our attention is directed, is the course pursued by the Israelites after their departure from Egypt.

And it came to pass, when Pharaoh had let the people go, that God led them not through the way of the land of the Philistines, although that was near; for God said, Lest peradventure the people repent when they see war, and they return to Egypt: But God led the people about, through the way of the wilderness of the Red Sea; and the children of Israel went up harnessed out of the land of Egypt. And Moses took the bones of Joseph with him: for he had straitly sworn the children of Israel, saying, God will surely visit you; and ye shall carry up my bones away hence with you. (Gen. xiii. 19.)

The Philistines appear to have been a people of the same race as the Hyksos, by whose ravages we have already shown that the Egyptians were very severely harassed. During the period of their bondage, the Israelites had not been permitted to learn the use of weapons, they were, therefore, likely to be daunted if immediately brought into collision with the most warlike nation of antiquity. It was necessary that they should undergo a long course of preparation by their wanderings in the desert, that they might learn confidence in themselves and in their God.

Joseph's anxiety to have his bones buried in the sepulchre of his fathers, is a feeling common in most nations, but it was one likely to be greatly strengthened by a residence in Egypt, where kings looked upon their tombs as of greater importance than their palaces. We find from the monuments, that the Egyptians had family cemeteries, and that it was considered a great disgrace to be excluded from them; and to ensure that none but the worthy should be admitted there was a solemn judgment of the dead, through which ordeal even the king's corpse should pass before it received interment.

RUSSIA. No. VIII.

CEREMONIES OF THE GRECO-RUSSIAN CHURCH.

FUNERAL RITES AND CEREMONIES.

The calm sublimity, the deep and tender pathos, the chastened hopes, that pervade the beautiful and purely spiritual service of *our* national church, must have been deeply felt by all who have once followed to their long home the mortal remains of one beloved: and who is there that has not done so? and who is there, though he may have bent over the grave with tears, that has not quitted it with hope, for the time "a wiser and a better man," beneath the influence of its soothing promises? Far from repressing the tenderest emotions of our nature, it encourages, whilst it regulates, ennobles, and sanctifies them.

The whole of the Greco-Russian church-service for the burial of the dead is highly impressive, but at the same time much too exciting. They have a singular form, peculiar to themselves, of making known the death of a person. The individual sent round to the friends and relatives to convey the tidings, would, supposing the name of the deceased to be John, and that of his father James, announce it thus:—*Ivan Jakovitch vam jclaët dolgo jcet;*—"John, the son of James, wishes you to live long," adding generally the family name of the individual.

The last struggle over, and the filmed eye closed by the hand of the nearest relative, the body, having first been washed, in accordance with the practice of ancient and modern times, is habited in its ordinary apparel, as is the practice of most countries on the Continent. The hands are crossed on the breast, and above them is laid a picture of the patron saint. If the individual had been in the service of the crown, the corpse is generally arrayed in full dress uniform. The priest is then summoned: after fumigating the apartment with incense, and blessing it by the aspersion of holy water, he reads a short formula: a few verses are then sung by the attendant choir, in a low impressive tone, and the service is then concluded with prayers for the soul of the deceased. It is generally the practice among the wealthier classes to retain a deacon or other inferior member of the ecclesiastical body, to read night and day selections from the Gospel, whilst the body remains in the house: this, however, is not ordained by the church.

Receiving intimation of the event, in the terms we have mentioned, the friends and relatives of the deceased throng to the house of death, to offer their condolence. The custom of paying a visit of this kind in mourning is not observed in Russia: indeed on entering the saloon the assemblage might almost be mistaken for one gathered on some ordinary occasion. The sombre attire, the quiet subdued tone of manners, the suppressed voice, the noiseless tread, are wanting. The rustling of silks, the jingling of spurs, the unstifled laugh, the elevated tone of voice, are little in harmony with the solemnity of the occasion. The wreaths of fragrant incense that curl through the opened door of the adjoining room, the monotonous sound of the reader's voice as he recites the Gospels in low and hurried tones, the sob of the bereaved, heard perhaps at intervals of silence, alone tell that the hand of the spoiler has been there.

By turns the visitors are introduced into the apartment, where the body lies in state. The coffin, placed upon a trestle covered with crimson embroidered velvet, differs altogether in shape and ornament from those used in England, rather resembling the ancient sarcophagi, but accommodated in length to the human figure. It also stands in the same way upon four claws: these are generally plated or gilt The covering is of crimson or pink velvet, or cloth, frequently sumptuously fringed with gold or silver: the lining is of white satin, and the head of the deceased rests upon a pillow of the same material. At the head and also at the feet are placed two enormous wax tapers, in massy silver or plated tripods. There formerly existed a practice of hiring mourners, or persons whose sole occupation it was to attend upon funerals,

To feign a woe they could not feel.

This repulsive custom, although not extinct, is nevertheless banished from the capitals, excepting among the more ignorant classes. The writer of this article has witnessed it repeatedly in the provinces, and once or twice in the ancient metropolis of Russia. Not only unauthorized by, but utterly at variance with, the form prescribed by the Greek church, it has in all probability been adopted in imitation of the customs of the Jews and Romans, among the latter of whom, as with the Russians, only women, called *præficæ*, were employed.

According to the laws of Russia, the body must be deposited in the church, there to remain until the final ceremonies, which are as follows:—

The streets from the house to the church, and thence to the cemetery, through which the hearse passes, are strewed with sprigs of the aromatic juniper. First come ten or twelve torch-bearers, in long black cloaks, the collars and narrow capes of which are bound with white, and wearing round hats with enormous brims, eight or nine inches in width, that hang upon the shoulders and back, and flap over the face. Each bears a flambeau of resinous gum. As the interments invariably take place in the morning, in the full blaze of day, the effect is most absurd. Although the funerals of private individuals were always performed by torch-light and at night, yet the Romans it is well known celebrate all public obsequies in the forenoon; and it is generally imagined, from a passage in Plutarch, also with torches. From thence, in all probability, the custom has descended through the early Greek missionaries in the first ages of Christianity; at any rate, the high antiquity of the practice is unquestionable. Next come the clergy habited in their sacerdotal robes, usually, on these occasions, of black velvet, embroidered with silver, the priests bearing tapers, the deacons censors with incense, and repeating at intervals, in recitative, short prayers for the repose of the soul of the deceased, the responses and the chorus to which are chanted by the choir which follows next in succession. Should the deceased have obtained any marks of distinction in the service, the badges of his orders, and the insignia of his office, are borne before the hearse on cushions of crimson velvet, carried by persons as nearly as may be of his own rank; a custom decidedly of classic origin. To these succeeds the corpse, the coffin exposed to view on an open hearse, and supported by servants attired in mourning. In some cases the lid is carried before, the body being covered as far as the chest by a rich pall of coloured velvet, gorgeously embroidered. In the obsequies of persons of rank or wealth, a canopy of crimson velvet, fringed with gold lacings, is placed over the coffin. Then follow the mourners and friends in carriages, whilst the slaves and supernumerary servants on foot, flank and terminate the procession.

After a brief halt in the narthex of the church when the lid, if it have remained on, is removed, the coffin is borne into the nave, and deposited on a bier of embroidered velvet, before the steps of the chancel. Large wax tapers are placed round it, and each of the attendant friends is also furnished with one of smaller size. These kindled, and the choristers sta-

tioned at each end of the chancel, the service begins with the 91st Psalm, which is sung in an under voice; afterwards follows the 119th Psalm, chanted in louder tones. At the end of each verse the Hallelujah Chorus is sung by the whole choir, invocations to the Virgin, and prayers for the dead, are then offered up, accompanied by the chanted response of the choristers. Among the hymns sung on the occasion is the following, attributed to Joannas Damascenas. At the conclusion of the prayers, the priest and deacons descend from the altar, and walking three times round the bier, perfuming with their censors and sprinkling the by-standers with holy water, then stationing themselves around, a solemn and affecting farewell hymn is sung, and the mourning friends hasten to pay their last honours and give the parting kiss; this is termed the *Aspasmos*, or last embrace.

Draw near, my brethren! ascribing glory to God, let us give our last kiss, and bid our last farewell, to our departed brother; engrossed no longer by the vanities or the cares of the world, he hath forsaken his kindred, and approacheth the tomb. His kindred and his friends where are they? Behold we are separated. May the Lord grant unto him repose!

But what a separation my brethren! what lamentation and woe attend this mournful hour! Draw near! Embrace him who was lately one of yourselves. He is abandoned to the grave, he sojourneth in darkness and must moulder with the dead. Now is he cut off from his kindred and his friends. May the Lord grant unto him repose!

Every unholy connexion with life and its vanities is dissolved. The spirit hath left its tenement, the clay is disfigured, the vessel broken. We bear a motionless, speechless, senseless carcase to the tomb. May the Lord grant unto him repose!

What is life? a blossom, a vapour, the light dew of morning. Come near, then, let us attentively contemplate the grave! Where now the graceful form? Where the sparkling of the eye, the beauty of the cheek? all, all, withered like the grass, have vanished from our eyes. Come, let us prostrate ourselves with tears, before Christ our Saviour.

What lamentation and woe, what tears and agonies when the soul is torn from the body! Hades and the bottomless pit yawn around. Life is a fleeting shadow, a dream of error, the fruitless toil of transitory being.

Fly then the contaminations of the world, that ye may lay hold of the kingdom of heaven. Let us approach, my brethren! and view the dust and ashes of which we are formed. Whither are we bound? What shall be our destiny? Who is poor, who is rich? Who is master? Who is slave? All, all, are but ashes. The glory of man passeth away: the flower of youth is plucked by death.

See the limbs now motionless which were lately strung with vigour. Lo! now they are powerless, the eyes are closed; the feet fast bound; the hands at rest; the ears have ceased from their office; the tongue hath no utterance. All are given up to the grave, behold all things terrestrial are vanity.

The scene is impressive, but everything around too strongly tends to arouse the imagination, and stimulate the feelings to a pitch of unnatural excitement, incompatible with the solemn and holy thoughts which should occupy the mind at such a moment.

Even to the casual stranger the excitation is irresistibly powerful, "he catches the trick of grief," and shares in the sorrow of the mourners, as he sees friend after friend with grief swollen cheek and streaming eyes, ascend the steps of the platform, falter out the valedictory prayer, and imprint the parting kiss on the lips and brow of the dead.

The last embrace given, and the farewell hymn sung, the procession resumes its way, in the same order, to the cemetery, where no further ceremonial is observed, excepting that the officiating priest casts first a little earth, in the form of a cross, into the vault, upon a coffin, and then pours upon it some holy oil, pronouncing the words, "The earth is the Lord's and the fulness thereof, the round world and they that dwell therein." He then dismisses the assembly with the doxology and benediction.

Services are performed, and the absolution and remission read at the church, or at the grave, on the third, ninth, and fortieth day, on the birthday, and on the anniversary of the demise of the individual. The two last are continued for an indefinite length of time. These services are not ordained by the rubric of the church, but have been sanctioned by long usage, and adopted from the practice of the primitive oriental Greek church, which practice is itself clearly deducible from the *Paternalia* of the ancients.

It is worthy of remark, that the Mussulmans observe also the third, ninth, and fortieth days, and provide feasts upon the occasion, as is done in Russia. The service on the third day is called the *Tretinui*, that on the ninth the *Devatinui*; the popular belief is, that the soul of the deceased has not, till this period, or till the expiration of the fortieth day, wholly shaken off the trammels of earth. This service has a parallel in the *Novendiale* of the Romans, a solemnity grounded upon the same superstition. Another practice, evidently of high antiquity, prevails throughout the country and amongst all classes. During the celebration of the service, a dish called the *Kootiyah* composed of rice, dressed with honey, to which raisins are sometimes added, is placed near the coffin; after the burial, each of the guests invited to the feast, usually prepared on such occasions, takes three spoonfuls of the *Kootiyah*, and repeats a short ejaculating prayer for the repose of the deceased's soul.

On the fortieth day prayers are again said, and a service performed, called the *Sorotchénui*, after which the priests, with the friends, are assembled to dinner, and commence by partaking of the "Kootiyah," accompanied with the usual prayer for the dead. Sometimes a daily service is performed till the expiration of the forty days: this is termed the *Coroköoustië*. It would be idle to record the numberless silly popular superstitions as to the origin of these ceremonies, that are prevalent, not only among the lower classes, but even amongst those who from rank and education might be expected to know better. From the prevailing imagination that the souls of the deceased hovered about the graves, it is well known that the ancient heathens were in the habit of preparing a feast for the dead and the living called the *Silicernium*, and that a portion of this was deposited on the tomb or within the temple. The fondness with which some of the early converts clung to these practices of their forefathers, blending them with the pure rites of their newly adopted worship, and the eagerness with which their steps were followed in succeeding ages, by the indiscriminating zeal of those who had not the same blinding associations of kindred and of country, will sufficiently account for the transmission of these customs to later ages and more enlightened times, although unsanctioned by the authority of the church, and in direct opposition to the simple character of its ritual.

Another coincidence is not unworthy of remark: the term *Bustirupus*, (the robber of the pyre,) was among the Romans one of the deepest execration and contempt. The Russians have a corresponding expression *Kootyanik*, a word signifying the "stealer of Kootiyah," one of the most opprobrious epithets that can be applied to the vilest criminal.

The will of the deceased is read, and his papers are examined on the fortieth day, when the seal placed on his property by the police is removed by the proper authorities.

THE DUTCH FISHERIES.

No. II.

COD FISHERY.

The Dutch Cod fishery is of less importance than the Herring. Those vessels which during November have been employed in the latter, are repaired and graved, so as to be in a condition for putting out to sea for the former on the 6th of December, that being St. Nicholas' day. No positive obligation attaches to that day, for the government-bounty regulations only require their going to sea before the first of January. The bounty amounts to three hundred florins, or about twenty-four pounds sterling.

Far fewer vessels are employed in the Cod fishery. Vlaardingen generally sends out about forty, but of all the other towns already mentioned, one other only, Maasluis, sends any.

The Winter Cod fishing is called *Beug vaart*, from the *beug* employed in it. This consists of a rope half a league in length, or more, with bouys at certain distances to keep it near the surface of the water, and armed throughout its whole length with lines and hooks, the hooks being baited with lampreys, or, if these cannot be had, with *geep*. As lampreys make the best bait, no pains are spared in getting them. A vessel with a reservoir for preserving them is sent before the fishing commences to England for a supply, the rivers there being better stored with them than those of Holland are. Each fisherman takes what he requires, and the remainder is deposited in a reservoir at Vlaardingen to serve for future voyages.

Previous to the flotilla's putting out to sea, there is appointed what is called the *Dank-segging-tag voor de schepens*, that is, *Thanks-saying-day for the ships*. Thanks are offered on the occasion for the expedition that is over, and prayers made for that which is to commence.

The vessels are not long at sea, returning generally with fresh and salted cod, within five weeks from their departure. The fish are all caught in the North Sea, and the season closes in March. In April the mode of capture is changed, and with it the term applied to the fishery. Lines are then employed; the fishery is called *kolreis*; and it closes in May, when the vessels return in order to prepare for the herring fishery. No fresh cod is brought home from the *kolreis*, the cod at that season being too fat and oily.

A third Cod fishing is prosecuted by the Dutch, which is called *Islandsche vaart*, from being carried on along the coast of Iceland. The vessels set out in May, and return to Holland in August or September. Though often lucrative, it is difficult and dangerous, from the coldness of the climate, and the storms encountered on the Iceland coast. The vessels employed, not above twenty-five in number, are brigs, and are all sent out by the villages on the left bank of the Maas. The cod fish they bring home is of excellent quality, and is known by the softness and delicacy of its skin, and the whiteness of the fibre when cooked.

The Whale fishery in Holland is called the Little fishery, to distinguish it from that of Herring and Cod, or the Great fishery. The Whale fishery was very considerable in former times, and was chiefly confined to Rotterdam adventurers. Large three-masted vessels were employed with numerous crews. They sailed either for the South Seas or for the coast of Greenland, and were often called *Groenlande-vaarders*.

This branch of industry used to be so much encouraged that even the public treasury bore the expense of some of the expeditions fitted out. But the same causes which injured the Dutch by reducing their once flourishing Herring fishery, affected that for Whales also. Successive wars prevented the vessels from putting to sea, and the government preferred employing them and their crews in the defence of the country. Five years ago the whaling vessels which then remained were wrecked, and almost all the harpooners perished; but the government is doing everything in its power to repair this last calamity and to revive the Whale fishery, now successfully prosecuted by the French. Among other things it is forming harpooners at its own expense.

THE PLANETARY SYSTEM.

Fair star of Eve, thy lucid ray
Directs my thoughts to realms on high;
Great is the theme, (though weak the lay,)
For my heart whispers *God is nigh*.

The Sun, vicegerent of his power,
Shall rend the veil of parting night,
Salute the spheres, at early hour,
And pour a flood of life and light.

Seven circling planets I behold,
Their diff'rent orbits all describe;
Copernicus these wonders told,
And bade the laws of truth revive.

Mercury and *Venus* first appear,
Nearest the dazzling source of day,
Three months compose *his* hasty year,
In seven *she* treads the heavenly way.

Next *Earth* completes her yearly course,
The Moon, as satellite, attends;
Attraction is the hidden force,
On which creation's law depends.

Then *Mars* is seen of fiery hue;
Jupiter's orb we next descry;
His atmospheric belts we view
And four bright moons attract the eye.

Mars soon his revolution makes,
In twice twelve months the Sun surrounds;
Jupiter greater limit takes
And twelve long years declare his bounds.

With ring of light see *Saturn* slow,
Pursue his path in endless space;
By seven pale moons his course we know,
And thirty years that round shall trace.

The *Georgium Sidus* next appears,
By his amazing distance known;
The lapse of more than eighty years,
In his account makes *one alone*.

Six moons are *his* by Herschel shown,
Herschel, of modern times the boast:
Discovery here is all his own,
Another planetary host!

And lo! by astronomic scan,
Three stranger *planets* track the skies,
Part of that high majestic plan,
Whence those successive worlds arise.

Next Mars, *Piazzi's* orb is seen,
Four years, six months, complete his round:
Science shall, renovated, beam,
And gild Palermo's favoured ground.

Daughters of telescopic ray—
Pallas and *Juno*, smaller spheres,
Are seen near Jove's imperial day,
Tracing the heavens in destined years.

Comets and fixed stars I see,
With native lustre ever shine;
How great, how good, how dreadful He,
In whom life, light, and truth combine!

Oh may I better know his will,
And more implicitly obey;
Be God my friend, my father still,
From finite—to eternal day.—Mangnall.

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THE ALBIGENSES. No. V.

THE CASTLE OF CRUSSOL, IN THE SOUTH OF FRANCE.

CRUSADE AGAINST THE ALBIGENSES UNDER SIMON DE MONTFORT—CRUELTIES PRACTISED UPON THE INHABITANTS OF THE CAPTURED CASTLES—SIEGE OF LAVAUR.

THE Castle of Crussol, situated in the ancient district of Vivarais, and in that part of it which forms the modern department of Ardèche, is one of the most picturesque of those ruined strong-holds so numerous in the south of France, and so interesting in the eyes of a Protestant, from their connexion with the memorable crusade carried on against the Albigenses, by the Church of Rome and its adherents, in the early part of the thirteenth century. It stands upon a lofty eminence of rock, not far from the right bank of the river Rhone, and nearly opposite to the town of Valence, upon the left bank.

It stands, (says Mr. Hughes,) on a conical cliff on the opposite side of the river, overlooking the town at about two cannon-shots' distance. On inquiring into the history of this eagle's-nest, we found that it had been, in days of yore, the fastness of a petty free-booting chief, who kept the inhabitants of Valence in a perpetual state of war and annoyance; a history which almost appears fabricated to suit its appearance and character. Seeing it relieved by a gleam of sunshine from a dark evening cloud behind it, we could fancy, without any great effort of imagination, that, like the bed-ridden Giant Pope in honest John Bunyan, it was grinning a ghastly smile of envy at the prosperity which it could no longer interrupt.

In a former paper* we brought down the history of the crusade against the Albigenses to the capture of the castle of Minerve, by Simon de Montfort, in the month of July, 1210, when that ambitious per-

* See *Saturday Magazine*, Vol. XII., p. 89.

secuting chieftain and his fanatical followers, compelled one hundred and forty persons, men and women, to leap into the flames, which they had kindled in the square of the castle. Immediately after, De Montfort proceeded to the siege of the castle of Termes, an extremely strong fortress upon the frontiers of Roussillon.

The capture of Minerve and Termes, two of the strongest places in Languedoc, produced a very disheartening effect upon the garrisons of other castles, who feared to put any trust in the strength of their walls against the overwhelming force of the crusaders. As De Montfort advanced from Termes to the northward, he found a large number of their fortresses deserted; the inhabitants had abandoned them in despair, and betaken themselves for security to the woods and mountains. But their flight did not save them from the unrelenting ferocity of their enemies; they were pursued into their retreats, where the greater part of them were put to the sword, the rest being taken captive to the camp, and burned for the edification of the army.

The prospect of a great addition to the army of crusaders in the ensuing campaign of 1211, inspired their leader with fresh confidence and boldness. The fervid zeal of the monks, loath to slumber in the cause of persecution, had never ceased to inflame the passions of the credulous vulgar; and the success which had attended their recent preachings, gave promise of a larger crowd of fanatical pilgrims than had visited the country of the Albigenses in either of the preceding years. De Montfort felt that it was no longer necessary for him to keep any measures, or, in the phrase of Pope Innocent, "to employ guile" with regard to the Count of Toulouse; and he prepared, therefore, to commence open hostilities against him. He was prompted to this step by a desire of gratifying not only his own ambition in adding the fine sovereignty of Count Raymond to his former acquisitions, but likewise the hatred which the abbot Arnold, and Fouquet, the persecuting bishop of Toulouse, had contracted for that unfortunate prince.

In the month of March, Simon de Montfort, finding himself at the head of a very large army, proceeded to open the campaign, and directed his first effort against the castle of Cabaret. This stronghold had hitherto successfully resisted the arms of the crusaders; but it appears that the continual reverses of the Albigenses during the two years of the war, had broken their spirit and deprived them of the hope of effectually contending with the overwhelming force which avarice and fanaticism had arrayed against them. For Peter Roger, the lord of Cabaret, opened his gates on the approach of De Montfort, and tendered his voluntary submission; and his example was followed by the chiefs of many other castles situated in the mountains, which separate the dioceses of Carcassonne and Toulouse. All these places on surrendering were treated with humanity; De Montfort rarely exercised this virtue, and this departure from his general practice is accounted for by his desire of obviating the delay which would have been occasioned to his progress, if he had driven their defenders to a desperate resistance, by showing them that they would be no better treated if they surrendered.

Lavaur, situated on the Agout at the distance of five miles from Toulouse, became now the object of attack. This place, which afterwards rose to be an episcopal city, was then only a strong castle, belonging to a widow named Guirande, whom her brother, Aimery de Montreal, had joined with eighty knights, after having been deprived of his own possessions by the crusaders. Both the noble lady and her brother professed the doctrines of the Albigenses; and they had opened an asylum within the walls of the castle, for those who were persecuted in other parts of the province. Lavaur was thus regarded by the crusaders as one of the principal seats of heresy; and as the fortress was surrounded by strong walls and protected by deep ditches; besides being well stored with provisions, its capture was deemed an object of great importance.

While the crusaders were undertaking the siege of Lavaur, Fouquet, the fanatical bishop of Toulouse, repaired to that city and displayed his zeal in the cause of persecution by gathering a band of auxiliaries. He told the inhabitants that the presence of a number of Albigenses in that city had rendered them an object of horror to all Christians; and that to purify themselves from the stigma of being confounded with those heretics, they should exhibit an exceeding zeal in arming themselves against those of their fellow-citizens who had departed from the Catholic Church. He succeeded in enrolling a large number of them in a society which styled itself the "White Company," and in token of the purity of its faith engaged to destroy the heretics by fire and sword. Five thousand of this body of fanatics he despatched to aid in the siege of Lavaur.

This siege was prosecuted by the crusaders with vigour. Their chieftain possessed a large share of military skill; and his experience had made him conversant with all the resources of the art of war in that age. He himself had served in the Holy Land; and he had in his camp many knights who had fought against the Mohammedans and against the Greeks, and in their eastern campaigns had acquired a knowledge of the attack and defence of fortified places. He was therefore able to employ against the walls of Lavaur ingenious machines, which had been but recently introduced among the nations of the west, and were as yet quite unknown to the inhabitants of the country bordering upon the Pyrenees. The most fearful of these was that called the "cat." It was a very strong movable wooden tower, which being built out of the reach of the besieged, was entirely covered with sheep's-skins, with the fur outwards to guard it from fire, and then being provided with soldiers at its openings, and on the platform at its summit, was moved on rollers to the foot of the wall. Its side then opened, and an immense beam, armed with iron hooks, projected like the paw of a cat, shook the wall by reiterated strokes, after the manner of the ancient battering ram, and tore out, and pulled down, the stones which it had loosened.

De Montfort succeeded in constructing a "cat," but the wide ditches of Lavaur prevented him from bringing it near enough to the walls. The crusaders, under the order of De Montfort, laboured unceasingly to fill up the ditch, whilst the inhabitants of Lavaur, who could descend into it by subterraneous passages, cleared away in the night time all that had been thrown in during the day. At last Montfort succeeded in filling the mines with flame and smoke, and thereby prevented the inhabitants from passing into them. The ditches were then speedily filled, the cat was pushed to the foot of the wall; and its terrible paw began to open and enlarge the breach.

On the third of May, 1211, De Montfort judged the breach to be practicable, and the crusaders prepared for the assault.

The bishops, the abbot of Courdieu, who exercised the functions of vice-legate, and all the priests clothed in their pontifical habits, giving themselves up to the joy of seeing the carnage begin sang the hymn *Veni Creator*. The

knights mounted the breach; resistance was impossible, and the only care of Simon de Montfort was to prevent the crusaders from instantly falling upon the inhabitants, and to beseech them rather to make prisoners, that the priests of the living God might not be deprived of their promised joys. "Very soon," continues the monk of Vaux-Cernay, "they dragged out of the castle, Aimery Lord of Montreal, and other knights, to the number of eighty, whom the noble earl immediately ordered to be hanged upon the gallows; but as soon as Aimery, the stoutest among them, was hanged, the gallows fell; for, in their great haste, they had not well fixed it in the earth. The earl seeing this would produce great delay, ordered the rest to be massacred; and the pilgrims, receiving the order with the greatest avidity, very soon massacred them all upon the spot. The lady of the castle, who was sister of Aimery, and an execrable heretic, was by the count's order thrown into a pit, which was filled up with stones; afterwards our pilgrims collected the innumerable heretics that the castle contained, and burned them alive with very great joy."

The expression of "very great joy" used by the writer whom Sismondi here quotes, is the phrase which he always employs upon a similar occasion. The writer is Peter de Vaux Cernay, a monk of Citeaux, who followed his lord Simon de Montfort to the crusade, and was doubtless an eye-witness of the enormities which he relates, and in the relation of which he seems to take as much delight as he ascribes to the actors in the perpetration of them.

ON ARTIFICIAL PEARLS.

Among those decorations which have at all times obtained a large share of admiration, may be reckoned Pearls. The delicate hue of these little globules has made them a very favourite ornament in nearly every part of the earth, especially in the East, where personal decoration is carried to a much greater extent than in most European nations. It is evident, from different allusions in the Old Testament, that Pearls were looked upon, several centuries before the Christian era, as the same costly and precious gems that they are in the present day. We will instance one from the Book of Job, chap. xxviii. v. 17; speaking of wisdom, Job says, "The gold and the crystal cannot equal it: and the exchange of it shall not be for jewels of fine gold. No mention shall be made of coral, or of *pearls:* for the price of wisdom is above rubies." The readers of Roman history are familiar with the story of Cleopatra, Queen of Egypt, who, as it is said, dissolved in vinegar a pearl, valued at 50,000*l.*, and drank it off. This silly exhibition of extravagance sufficiently shows what an enormous value was placed upon Pearls in those days; and we can scarcely wonder that attempts should have been made, at a very early period, to produce something that should present a similarity to Pearls.

We have already given a description of the Pearl Fishery in Ceylon*, so that we need not describe, at any length in this place, the mode of procuring natural Pearls, except so far as we have anything new to say upon the subject. Some of our readers, then, are probably aware, that Pearls are extracted from the shells of a large species of oyster, (about three times the size of common oysters,) which grow in the shallow seas about Ceylon, Sumatra, Japan, the Persian Gulf, and other places on the shores of Asia. These oysters are brought from the bed of the sea, several feet below the surface, by divers, who follow that perilous avocation as a means of living, and are able to remain under water for several minutes at a time.

The best Pearls are found imbedded in the soft pulpy substance of the oyster itself, but others, of an inferior quality, are often found imbedded in the shell, from which great care is required to extract them. Respecting the origin of Pearls great diversity of opinion has prevailed, but the most probable conjecture is that of Raumur, a French writer, who, about 120 years ago, paid much attention to this subject. He considered Pearls to be the result of disease, in the same way as stone in the human bladder is known to be; that they were originally fluid, forming part of the vital system of the animal, but that having burst the vessel or membrane which contained them, they hardened into a little round solid, which became the Pearl. This opinion is supported by a statement which has been made, that if these oysters be pricked while alive, a fluid will be discharged, which on hardening very much resembles a Pearl; and it is further supported by two other circumstances, which we shall presently notice.

The love of gain is such a ruling passion, that when men find there is either a large demand for an article, or a high price paid for it, they seldom fail to devise some means by which the supply shall be rendered more abundant. Accordingly many attempts were made to render the oysters more prolific of Pearls. These schemes appear to have been of three kinds. *First*, to prick the oyster; *second*, to perforate the shell; and, *third*, to introduce five or six small beads within the shell. The mode in which these processes acted was as follows.

First.—The Indians, after catching the oysters and opening the shells, pierced the oysters with a sharp instrument, when a few drops of glutinous liquid oozed out, which they received in little iron moulds, formed into a globular shape. When the globule had hardened, it assumed all the appearance of a Pearl. This description, which is met with in but one or two ancient authors, is not considered to be of sufficient authority, as nothing of the kind is known at the present day.

Second.—When the shell of the oyster is perforated with a small hole, the little inhabitant, to exclude unwelcome intruders, fills or stops the inner edge of the hole with a glutinous matter, which hardens into Pearl, not equal to the natural Pearls, but still possessing some value. This statement rests on better authority than the former, for Linnæus, the great botanist, announced that he had produced the same phenomena with mussels. It is necessary to remark here, that Pearls have been found in mussels off the coast of France, and that in the museum of the late Sir Joseph Banks, a mussel-shell was deposited, in which a small fragment of iron was found sticking, round which a pearl-like substance had collected. It was supposed that the iron was part of a sharp instrument, broken off in the act of piercing the shell.

Third.—The Chinese have a mode of enticing the oysters to the surface of the water, and inducing them to open their shell, (rather more successful it would appear than the mode of catching birds by putting a little salt on their tails,) the artful fishermen then drop into the cavity of the shell a string of five or six small beads, made of mother-of-pearl, and then allow the oysters to escape. This takes place in the Spring of the year and in Autumn, when the Pearl Fisheries occur, the beads are found to be encrusted with a sort of enamel, which gives them a close resemblance to Pearls. This deception is believed to be carried on at the present day in the Indian Seas.

It may be as well here to state, that mother-of-pearl is the interior surface, or scale, of the shell of another species of oyster, existing in the same seas; indeed

* See *Saturday Magazine*, Vol. II., p. 5 and Vol. VI., p. 178.

it is often seen in the shell of the common oyster, and being therefore much more plentiful than Pearls, can be substituted for them in the above piece of trickery at a small expence.

All of these schemes, however, are productive of pain to the poor little inmates, and we cannot but condemn them as cruel modes of providing decorations for the persons of our fair countrywomen. It is, however, less objectionable than a method practised by the ladies of South America, who cover portions of their dresses with living diamonds, which the light emitted by the fire-flies of the country affords. The poor insects are attached by means of pins.

We now propose to show, that very accurate facsimiles of Pearls may be produced, although still, we regret to add, at an immense sacrifice of animal life; but we may previously remark, that attempts have been made to melt or soften small or broken Pearls into one larger one. A large Pearl is worth a great deal more than two Pearls of half the size, and this has induced many to try that transformation. Accounts have been given of a mode of softening the small Pearls, by steeping them in a mixture of strong vinegar and Venice turpentine; but it does not appear that the success was such as to induce a continuance in that plan.

In the sixteenth century glass-beads were constructed at Venice, and coated with a kind of pearl-coloured varnish, which gave them a rough resemblance to Pearls; but the result seemed to show that the resemblance was not very good, for they were shortly afterwards superseded by little balls of wax, covered with a pearl-like enamel; but, unfortunately, the enamel was not capable of resisting moisture, and it soon became eaten into small holes, so that these artificial Pearls required frequent enamelling.

We are not aware that any further improvement took place in these attempts to imitate nature, until about the year 1656, when M. Jaquin, a bead-maker in Burgundy, happening to look into a vessel in which some small fish (the *Cyprinus alburnus*, called in England the *blay* or *bleak* fish,) had been kept, he perceived a pearl-like powder, which had evidently come from the scales of the fish, and, by following this process, he obtained the powder at pleasure. He put a number of the scales into a small quantity of water and washed them well, then poured away the water, and repeated the process with clear water several times in succession, until nothing further could be washed from the scales. The water was then put by; a sediment fell to the bottom; and on pouring the water from the sediment, the latter appeared as a thick creamy liquid, having that delicate silvery appearance which distinguishes pearls. It instantly occured to him, that the discovery might be made a source of profit to himself. He therefore constructed small beads of plaster of Paris, and coated them with this new substance mixed with isinglass. The close resemblance to pearls was immediately acknowledged, and a great demand for them quickly arose. But the heat of the fire, as also the moisture of the human body, was found to injure the surface of the beads, and some ladies of Paris proposed to Jaquin that he should make hollow beads of glass, and coat them on the inside with his new pearl composition, which he called *Essence d'Orient*, or, Oriental Essence. He acquiesced in the proposal, and thus arose the mode of making artificial Pearls, which has existed but with few alterations to the present day. The attempt succeeded, and the manufacture of bead Pearls became an important branch of business.

The mode of making the bead and coating the inner surface may be thus briefly explained. All vessels made of what is called blown glass, such as drinking glasses, bottles, &c., are formed when the glass is in the state of paste. A hollow tube about three or four feet long is dipped into a pot containing melted glass, a portion of which adheres to the tube. The workman then blows through the tube from the other end, and the glassy paste becomes hollow, in a manner similar to the soap bubbles blown from a tobacco pipe. The blowing is continued until the glass has assumed nearly the form requisite, after which the finishing is performed by hand. But in making glass beads a different process is adopted. A very fine and narrow tube of glass is taken, one end is placed in the flame of a lamp, and the operator blows through it from the other end. When the end of the tube is melted, he blows it out into a globular form, breaks it off, and then proceeds with another. This is done with such rapidity, that an expert workman is said to produce from five to six thousand of these glass globules in a day; but, as some attention is paid to the shape and appearance of these beads, a great number are rejected on account of their ill-shape. In order to resemble nature more closely, these beads are often purposely made with blemishes, and of forms somewhat irregular, such as pear-shaped, oval, or flattened on one side, in imitation of natural Pearls, which are set in such a way as to show only one side.

The beads for the mock Pearls, are made in this manner, the glass of which they are formed having a blueish tinge to assist the imitation of Pearl.

The Essence d'Orient (or Pearl Essence, we may perhaps call it,) is then heated; a single drop is taken up on the end of a tube and dexterously blown into the centre of the bead through one of the two holes which always exist in them. The bead is then shaken about either in the hand, or in a machine, until the interior surface is completely covered with the paste. It is then left to dry, and the cavity of the bead is then filled up with white wax, which answers two purposes, namely, to strengthen the bead, and to make its weight more nearly equal to that of real pearl. A hole is then bored through the wax to receive the string.

Thus has this curious branch of business been brought to perfection, a pleasing instance of the manner in which the manufacture of a mere trifle or toy may be made a source of honourable and lucrative emolument. We believe that, up to a recent period, the descendants of M. Jaquin still carried on the manufacture in Paris, while in different towns of France large numbers of these little mock Pearls are being made daily.

The blay, or bleak, is a fish about four inches in length. They are found in great abundance in some rivers, and being exceedingly voracious are taken without much difficulty. The scales of 250 of these fish will not weigh above an ounce, and this again does not afford more than a quarter of an ounce of pearl powder; so that, it is computed, that 16,000 fish are necessary in order to obtain one pound of essence of pearl.

The river Seine, although abounding with this fish, does not furnish an adequate suppy. The scales of the fish are therefore sent to Paris from other rivers in large quantities in bottles containing solution of ammonia, which preserves the scales.

We may observe in conclusion, that it is remarkable that the only substance hitherto successfully employed in this imitation, is, like the Pearl itself, derived from fish. And when we observe, (which we

cannot fail to do,) that the interior surface of the shells of many fishes possess those delicate tints which form part of the beauty of a Pearl, we are justified in believing that there is some peculiar fluid existing in a large number of fishes, which, when dried, presents a surface having that beautiful appearance which we term *pearly*.

RUSSIA. No. IX.

Funeral Ceremonies. No. 2.

In our preceding paper of this series, we described the funeral obsequies of one of the higher classes, not because we were won by the costly array of the lordly funeral, where vanity too often would fain coquet with death, and ostentation bedizen with its tinsel the dark passage to the tomb, but because it afforded an opportunity of remarking those peculiar customs, which among the poor are neglected from sheer poverty.

The writer of this article, not many months ago, witnessed a scene of every-day wretchedness, which he cannot forbear to describe, as a contrast to the description given. In one of the principal thoroughfares of the ancient metropolis of Russia, during the Carnival week, his attention was attracted to a funeral of the humblest aspect. On a rough country cart, drawn by one miserable horse, and driven by a ragged peasant boy, was laid a coffin, formed from the trunk of a tree, rudely fashioned with the axe, and without one single emblem or ornament, except a coarse tattered quilt, half covering it, yet exposing to view the emaciated features of an aged peasant, with hoary hair and long gray beard. No mourners followed, excepting two peasant men, with an old time-bowed woman, who tottered by their side, and who wore the only mark of mourning, a rusty black ribbon bound round the head. The cart was preceded by a solitary priest, whose hurried step and restless air told that he grudged the unprofitable hour. Curiosity, think it not an idle curiosity, prompted an inquiry. The old man had dwelt in a common lodging-house for peasantry, and had gone to his rest the evening before, an evening everywhere in Russia devoted to festivity: his spirit had taken its flight whilst the din of revelry rung around him. He was unknown to those whom Christian charity had induced to follow him to his place of rest. A stranger had closed his eyes, and the chill hand of cautious charity had given him his coffin, and hollowed out his grave. The humble train passed on in silence unnoticed, or noticed but for one brief moment as the passer-by raised his hat, hastily crossed himself, and muttered the valedictory prayer.

Carriage after carriage dashed rapidly past, filled with the youth and beauty of the city, in their gala attire, hastening to the scene of promised enjoyment at the public promenade. Few cast a look towards the bier of the poor peasant,—for what had youth and beauty to do with old age, poverty, and death? The contrast was painfully striking.

Although by an *ukaze*, issued in 1801, the laws of the empire strictly forbid the interment of a foreigner, of different creed, within the limits of consecrated ground, the Greco-Russian Church refuses the mere ceremonial rites of burial to none. If, however, a Protestant, in his last hours, receive the Holy Sacrament, or the extreme unction, as will sometimes happen in remote parts of the country, from the ignorant, though well-meant, zeal of those around, to secure for him a portion of hallowed earth, he is considered as received within the pale of the church, from which, under the heavy penalty of the law, he can never secede should he chance to recover. All children subsequently born to him are legally subject to its discipline, and must be educated in its faith; and, even a posthumous child is placed in the same circumstances. Instances have frequently occurred, nevertheless, where bigoted ignorance has refused Christian rites to the body of a Protestant, though happily the instances are rare.

A distressing case of the kind recently occurred within thirty miles of Moscow. An Englishman of unblemished character, an overseer in the establishment of a Russian manufacturer, died suddenly at the works. His afflicted wife was naturally anxious that her husband's remains should rest besides those of his countrymen in the English burial-ground; but the proprietor, dreading the interference of the police, refused even the loan of a cart to convey it thither. Only a short time established in the country, she knew but little of the language, so little as to be scarcely enabled to make herself understood; every human being stood aloof;—the very peasants, influenced doubtless by fear of the legal responsibility, refused to lend their carts, though promised liberal recompense. The police urged instant burial, the master peremptorily ordered the corpse to be taken from his premises; and the desolate and friendless widow, as a last and inevitable resource, applied to the priest, "to give a little earth for charity." He refused, the deceased not having been of the Greek faith. Entreaties and bribes were alike in vain. Further delay being impossible, a shallow hole was scooped in the corner of an open field, by the Russian workmen whom he had superintended; by their hands he was laid shroudless, in his unblessed grave; his poor daughter, anxious that some semblance of a religious ceremony should mark the consigning of her deceased parent to the earth, attempted to read the sublime funeral service of our church; she sobbed through a few prayers, but overcome by her feelings fainted beneath the effort, and was borne off by her distracted mother. The hole was filled up, the business of the day went on as usual, and the bereaved family sought refuge and consolation among their countrymen in Moscow.

They sought it, and happily they found it too; nor did their wrongs go unredressed. The heart-rending circumstances of the case, were, as a matter of courtesy, laid before some individuals of rank and influence, previously to seeking redress through an official channel. The Metropolitan, a man of distinguished learning, piety, and benevolence, before whom the affair was laid, directed immediate inquiry to be instituted. The result confirming the statement given, the priest and the police received each a severe reprimand; and, had a vindictive spirit, in urging to extremities, prevailed, they would, undoubtedly, have been severely punished. The end, however, was attained; the body exhumed and placed in a coffin, was brought to the English burial-ground, where it was interred with Christian rites.

It is but justice to remark, that in Russia the higher authorities are always ready and energetic in correcting the abuses of subordinates, and in affording protection to foreigners of every nation and of every creed, but there is considerable difficulty in getting access to them. If, however, these scenes are witnessed in a country where toleration is part of the national religion, what may not be expected in those whence it is excluded?

Poverty.—That man is to be accounted poor, of whatever rank he be, and suffers the pains of poverty, whose expenses exceed his resources; and no man is, properly speaking, poor, but he.—Paley.

ON EMPLOYMENTS WHICH INJURE THE EYE-SIGHT.

No. III.

FIXED OR FLOATING SPECKS IN THE EYE—CAUSES, REMEDY, PREVENTION—EMPLOYMENTS WHICH INDUCE THE DISEASE—STRAINING THE EYE—SNOW BLINDNESS—EFFECT OF DARKNESS UPON VISION.

We now proceed to notice a few only of the symptoms of *amaurosis*, and, as far as we can, to trace its cause to an injudicious employment of the organ.

(1.) Many of the diseased affections of the eye proceed indirectly from indigestion, a morbid condition of the stomach, the liver, and bowels, resulting from sedentary employment, and the consequent want of that exercise of the body which is so indispensable to the healthy action of all its parts. The fine delicate nervous filament, the retina, possesses a very remarkable property when subjected to pressure, namely, that of becoming luminous, or of conveying to the mind a luminous impression This may be seen in health and in a dark rooms, by pressing upon the eye-ball; but its inconvenient, and even alarming instances, occur when the stomach is deranged and headache is present; then the blood-vessels of the head are surcharged, and by pressure on the retina produce appearances of various forms, often a faint phosphorescent haze floating before the eye, varying in shape and colour, and sometimes of various colours at the same time. The morbid sensibility of the retina in these cases is often such, that persons have been able to read even in the darkness of night*; and it is not an uncommon remark with amaurotic patients, that an improvement in vision is observed while inflammation is present, which ceases as the inflammation subsides. These appearances are not so common as the presence of fixed or floating spots, (*muscæ*, or flies, as they are called,) which darken a small portion of the field of vision. Their presence is very common to persons of sedentary habit, after about thirty or forty years of age, often earlier, depending, of course, on the average state of health of the individual, and the "wear and tear" to which he has exposed his eyes. The fixed spots sometimes co-exist with the floating, and the latter are constantly varying in size and shape, which depend on causes not well understood. These spots sometimes appear as globules, or rings, or disks; they very commonly resemble particles of soot, transparent vesicles, or minute globules strung together like beads on a thread, or small bulbs with hairs attached to them, or waving lines. With some persons they are seen in the air, or only when the eye is directed to the sky, or a white surface; sometimes they appear only in the flame of a candle or lamp, and others see them only on the ground. Sometimes one eye only is affected, at other times both. They frequently precede or accompany indigestion, or bilious headache, or constipation, while they are often absent when the health is good. These floating spots do not generally interfere with useful vision, and they frequently disappear on looking through spectacles. Such are the general features of the floating muscæ. Their cause is said by some to depend on a disordered circulation in the vessels of the retina, while others attribute the cause to floating particles in the humours or minute points in the cornea.

The writer of this paper is himself the suoject of this disease, and, therefore, feels a more than usual confidence in addressing what, he fears, is a large number of readers similarly affected to himself. If he succeed in removing from the minds of such, any ill-grounded fears and apprehensions concerning the ultimate result of these singular affections, one great object of the present article will be achieved; but a still more important object is to warn such of our readers who may be blessed with good and perfect visual organs how they employ them; that is, to establish in their own minds a clear definition of the use of an organ and of its abuse; they will then not have the excuse of ignorance, if, in after years, through any fault or misfortune of their own, they become amaurotic.

There is a case reported by Dr. Travers, in his *Synopsis of the Diseases of the Eye*, so interesting, and so much in point, that we proceed at once to lay it before our readers. It is the case of an intelligent young gentleman, written by himself, and shows clearly the origin, progress, and gradations of this disease. He says,—

About a year and a half ago, the first symptoms appeared which gave me any uneasiness with respect to my sight. For several months I read incessantly, not only throughout the day, but also for five or six hours each night by candle-light, and I now perceived numerous circular motes, which, combining, formed clouds of irregular figures before my eyes. These motes always appear when I look at the sky or any light-coloured object in a strong light; they move with the eyes, retaining for some time the same position, with relation to each other, and to the centre of vision; each consists of a slightly opaque circumference and a central spot, the diameter being, as well as I can judge, about four or five minutes of the circle of vision. Sometimes films appear curved or twisted like hairs, and of the same degree of opacity as the motes. There is a collection of these films always before the right eye, but at such a distance from the centre of vision as not to disturb sight. The number of the motes seems increased by violent exercise, as well as by close reading, or a disordered state of the stomach. Sometimes for a moment a small circular black spot appears near the centre of vision, and sometimes, though not so frequently, one faintly luminous.

The candle next appeared surrounded with a faint halo, which became more vivid as I continued this severe exertion of my sight. When my eyes are unusually weak, or a light is presented to them after I have been some time in darkness, instead of the halo, a globular appearance of a muddy yellow colour, surrounds the flame.

About six months ago, I began to be annoyed by the retina retaining impressions made upon it. After looking at any white or bright metallic object, on turning away my eyes, I distinctly perceive its outline, in a darker shade, on any surface to which I may direct my view; the impression lasting from two or three seconds to half a minute, according to the strength of light, the brightness of the object, and the length of time for which I have viewed it. The flame of a candle leaves its image impressed on the retina frequently for a couple of minutes, the sun for a still longer time, the image in both instances being of a muddy yellow colour.

A kind of penumbra surrounds light-coloured objects in a strong light, and prevents me from accurately distinguishing their outline. When the object is under a sufficiently small angle to be seen entire without moving the eye, it seems double; one image being such as would appear to a healthy eye, the other much fainter; thus is the moon seen, a piece of money, or the gilt letters over shop-windows. These appearances take place indifferently, whether I use either eye or both.

In a few instances, a very severe exertion of my eyes produced the appearance of innumerable black partic'es dancing before them.

When I read for any considerable time, I have a disagreeable sense of heat in my eyes, with pain in the eyeballs, extending to the lower part of the forehead. I am not constantly subject to headaches, though occasionally afflicted with them, especially if I delay breakfasting for any length of time after rising. My tongue is frequently foul for weeks together, my digestion seems weak, and I seldom enjoy a good appetite.

I ought to observe, that most of the above-mentioned

* This is stated on the authority of Dr. Jacob.

symptoms seem to have been mitigated since I came to London. Since the application of the blisters, the halo round the flame of the candle has nearly disappeared.

It appears then that the muscæ may be removed by attention to a few simple rules of regimen, by resting the eye, and giving it only a fair share of daily employment. If the general health be good, the constant presence of the floating muscæ may be regarded as perfectly harmless insects, which are solitary and will not increase; but if the health be in a low, fitful, and uncertain state, the muscæ, in common with the insect tribe whence they take their name, will increase and multiply as time goes on, and may in such case be regarded as the prelude to a still more disordered action of the visual organ.

In the first division of employments which induce this disease, we have spoken of such as are sedentary. Persons engaged in them are, like ourselves, students, writers, draughtsmen, &c.; also watch-makers, engravers, and such as are employed in some factories, as needle-workers, and those whose employments require the head to be bent over their work, by which the vessels of the eye are often surcharged with blood, and its powers taxed beyond endurance, by being strained to the perception of minute objects. The very familiar term which we have just employed, "straining the eye," is liable to the serious objection of being unmeaning, of conveying no precise idea to the mind, although the act indicated by this expression is sufficiently intelligible to all. It seems to consist in compressing the eye, by means of the muscles attached to the globe, and by this means it becomes more convex than is natural. It must, however, be admitted, that we are ignorant how it is that the constant employment of the eye, in viewing minute objects, where an unusual quantity of light is not employed, is injurious. It has been inquired, whether in these cases, the retina is in a state of excitement with morbid sensibility, a state approaching to inflammation? or whether it is the very reverse, in a state of impaired sensibility and defective vitality? Now if we may be allowed to hazard a conjecture, we should trace much of the disordered action of the eye from the above causes, to the employment of the double convex lens which is so customary with watch-makers, engravers, &c., whereby the adjusting powers of the eye are ever varying, and this, as we shall see further on, is productive of diseased action in the eye. Again, it must not escape our notice, that persons engaged in minute work, constantly employ artificial means for condensing the light by means of shades, globes filled with water, and double convex lenses, and so directing it to a small part of their work-table, while the rest of the apartment is comparatively obscure. It is notorious that minute work requires a good light, and it is probable, that the causes of disease in these cases are to be found in the second class of employments, which we are just about to consider as well as in the present class. The writer has conversed with a few intelligent watch-makers, who state that they suffer much from head-ache, &c., while they admit their inability to see clearly objects at great distances. It is also worthy of remark, that the writer has noticed in those persons, that the pupil is unusually small, contracted as it were to a mere speck. It would be worth inquiry, whether a clear view of minute objects is accompanied by the contraction of the pupil; this is a point which our readers can ascertain for themselves. We need not illustrate this division by cases, since the cause is sufficiently obvious, and the reader can supply instances from his own experience.

(2.) The sensibility of the retina is morbidly increased by causes opposite in their nature, while their effect is the same. Travellers inform us of a disease common to the inhabitants of snowy countries, which disease is called snow-blindness; and it is found necessary to protect the eyes by means of a goggle made of wood, leather, &c., with a slit opposite the pupil. Captain Parry and other arctic travellers make frequent mention of this disorder, and speak of covering the face with black crape, which proved an effectual remedy. On the other hand, persons confined in dungeons have acquired the power of distinguishing surrounding objects with the greatest facility in their obscure dwellings, wherein at their first entrance no light whatever could be detected. This power is due, in the latter case, to the peculiar mechanism of the iris, as well as to the increased sensibility of the retina. The iris is composed of two sets of muscular fibres, the one tending like radii towards the centre of the circle, and the other forming a number of concentric circles round the same centre, which centre is the pupil, whose diameter varies by the action of the two sets of muscular fibres which compose the iris. When a luminous object is seen the circular fibres contract, and the radial fibres are relaxed; and thus the size of the pupil is diminished. In dark and obscure situations the radial fibres contract, and the circular are relaxed; and the pupil is thus enlarged, so as to admit a greater quantity of light. The healthy action of the eye very much depends on the perfect operation of the fibres of the iris.

WIGS AND HEAD-DRESSES. No. II.

Wigs were not generally worn in England until many years after they were in common use in Paris. The first noticed in this country was worn by Henry the Eighth's fool, Saxon; and in Shakspeare's time the players resorted to the use of them to produce effect in personating different characters; that great poet makes Hamlet say,—"It offends me to the soul to hear a robustious periwig-pated fellow tear a passion to tatters."

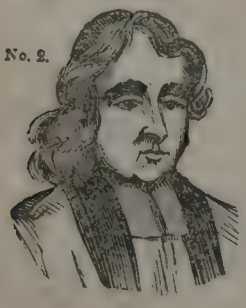
In the reign of King Charles the First, long hair had become fashionable at the court, and as all were not furnished with flowing locks, it was necessary to supply the deficiencies of nature by art, and this gradually led to the introduction of the peruke, except amongst the members of the bar, who did not assume the wig until about 1670. The perukes were made to assume the appearance of real hair as much as possible, and arranged so as to flow over each shoulder and down the back; the size of these wigs continued gradually increasing through the reigns of Charles the Second and James, until, in the reign of William and Mary they had reached their fullest extent. No. 1 is a representation of the kind of wig then worn by persons of distinction. The size of these wigs was so excessive, that ten heads would not have furnished a quantity of hair equal to the contents of one of them; the curls were made to flow down the back, and hang over the shoulders, half way down the arms.

Louis the Fourteenth's wig was so large, (for the same fashion prevailed in France,) that he was said to rob the heads of his subjects to cover his own; and so great was the demand for hair in England, that in 1700, a young country girl received sixty pounds for her head of hair, and the gray locks of an old woman, after death, sold for fifty pounds; wigs in common were as much as forty pounds each. The clergy had hitherto, with some exceptions, worn their own hair,

but at the beginning of the eighteenth century they began to assume the description of wigs which has

No. 1.

only gone out of use in late years. No. 2 shows the manner in which the hair was worn by a Bishop of London in the reign of Charles the Second, before the clergy had assumed the curled wig of more recent years.



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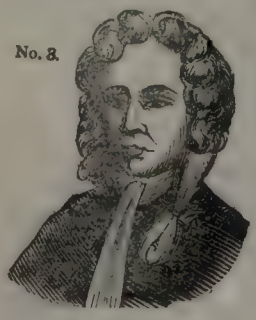
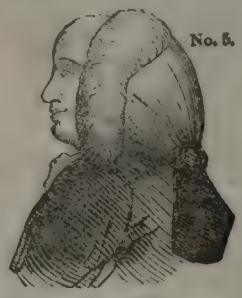


No. 3.

As the wig had reached its largest size during the reign of William, so in the succeeding reigns, those of Anne and George the First, it was more generally worn by all classes, and was made in the greatest variety of forms. About 1720, it was fashionable to tie one-half of it on one side into a club, as in No. 3. A few years after, bag wigs came into fashion; several ludicrous specimens of these are represented in the next engravings; the first two are copied from Hogarth's plates, about 1730, and the third was in

No. 4.



No. 5.

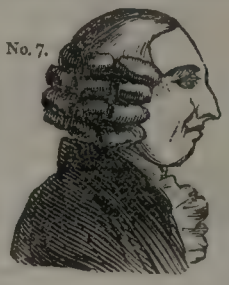
fashion in 1792. The bag was made of black silk to contain the *queue*, and was ornamented with a bow or rosette of the same. This rage for wigs was carried to such an extent, that even children were decked out in them. About 1763, the fashion of wearing wigs was on the decline, and that to such an extent, that the peruke-makers of London presented a petition to the king, in which they complained also of the vast

No. 6.

number of French hairdressers who had introduced themselves into this country.

At the end of the last century the wig began to fall into disuse; many contented themselves with their natural hair, in which they wore powder, and those who still retained this article of dress were satisfied with a wig of less imposing appearance; but still, in many cases, the *queue* was retained, and sometimes it was made of an extravagant length and thickness, tightly bound round with riband so as to resemble a solid mass rather than a bundle of pendant hair. The statue of George the Third, in Cockspur-Street, London, furnishes a good example of this appendage to the wig, but even this sinks into insignificance when compared with the *queue* which was formerly worn by the sailors in the Royal Navy; this reached nearly to the bottom of the back, and must have been very inconvenient to the wearer. These tails were abolished in the navy some years back, and shortly after the filthy powder worn in the hair of the soldiery was also abolished, and the hair was cut close.

The wigs of the latter part of George the Third's reign, as we have noticed, assumed a less dignified appearance, as shown in the annexed figures. Since



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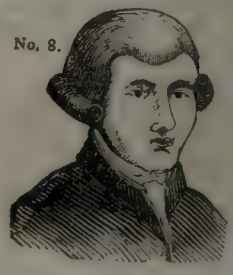

No. 8.

that time even wigs of this description have fallen into disuse, and the chief work for the peruke-maker now consists in the manufacture of natural scratches, as they are called, for the use of those whose health and comfort require such protection, and of those whose tastes deem them essential to appearances. The real wig is now confined exclusively to the bench of bishops, many of whom, however, do not wear it, and to the members of the legal profession, who cannot dispense with it.

Self-love but serves the virtuous mind to wake,
As the small pebble stirs the peaceful lake;
The centre moved, a circle straight succeeds,
Another still, and still another spreads;
Friend, parent, neighbour, first it will embrace,
His country next, and next all human race.
Wide and more wide, the o'erflowings of the mind
Take every creature in of every kind.—Pope.

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SOME ACCOUNT OF THE CITY OF ROME. PART VIII.

VIEW OF THE EXTERIOR OF ST. PETER'S.

HISTORY OF ST. PETER'S.

THE ancient basilica, which preceded the present Cathedral of St. Peter, was erected in 324, by the Emperor Constantine; and it has been a constant tradition of the Romish Church that the spot on which it stood was the burial place of St. Peter, after his supposed martyrdom on the site of S. Pietro in Montorio. In the middle of the fifteenth century this basilica was verging on ruin; and the reigning pontiff, Nicholas V., undertook to erect a new building "on such a scale, and with such accompaniments," to use the words of Mr. Woods, "that even the present work, with all its appendages, and the adjoining palace of the Vatican, are hardly equal to it. Three straight streets, with porticoes on each side, were to have conducted to the church. This was to have been formed on the most magnificent scale, and finished with the richest materials: adjoining would have been a palace, large enough to afford accommodation to the pope and all his court; to all the Cardinals and their attendants; to various officers of government; and, besides this, spacious apartments for as many sovereigns with their numerous suites, as could be ever at one time at Rome: add to all this, pleasure-grounds, gardens and fountains, and a great theatre for the ceremonies of coronation*." The pope died, however, and with him his vast designs. Fifty years afterwards, the project of building a new church was resumed by Julius II., who invited different artists to send in their plans. "Such a competition," continues the author of *Letters of an Architect*, "took place on this occasion, as is not to be seen in these degenerate days: Bramante; Giuliano di San Gallo; Fra Giacomo, or perhaps rather Fra Giocondo; Peruzzio; Raphael; and J. Battista Berti, produced their designs; but that of Bramante was preferred."

Bramante began to clear the ground by pulling down a part of the old edifice in 1503; the first stone of the new structure was laid by Julius himself, on the 18th of April, 1506; it was deposited under one of the four enormous pillars which support the cupola. Bramante lived to see the whole of these four pillars raised as high as the cornice, and upon them the arches turned, upon which the great dome itself rests. He died in 1514. His patron, Julius II., had died the previous year; but the successor of Julius, Leo X., carried on the work with increased energy. "It is well known," remarks Dr. Burton, "that both Julius and Leo carried to a much greater length than any of their predecessors the sale of indulgences. The justification of such a measure was principally taken from the desire entertained by the Roman Pontiff for rebuilding the church of St. Peter: and as the Reformation is certainly to be ascribed in a great degree to the offence raised by this scandalous traffic, we may say, without aiming at a paradox, that the efforts of the Roman Catholics to beautify their Metropolitan church, contributed, in some degree, to produce the Reformation."

* The coronation of the Emperor, apparently is meant. If the design of Nicholas had been carried into effect, his theatre would never have been used; for it happens that he was the last pontiff who was "importuned by the presence of a Roman Emperor."

The architects who succeeded Bramante were Giuliano and Antonio di San Gallo, with whom was associated the great Raphael who had already immortalized himself by the great paintings which he had been executing in the Vatican since 1508. Dr. Burton quotes a letter written by Raphael upon the occasion of his appointment, wherein he says, "His Holiness, in conferring an honour upon me, has placed a great load upon my shoulder; this is the superintendence of the building of St. Peter's. I hope that I shall not sink under it: and the more so, as the plan which I have made for it pleases his holiness, and is commended by many men of genius. But I raise my thoughts even higher. I could wish to reach the beautiful forms of the ancient buildings; nor can I tell whether my flight will be like that of Icarus. Vitruvius affords me great lights, but not enough."

Raphael died in 1520, and Giuliano di San Gallo before him; they did nothing beyond strengthening the four great pillars which Bramante had raised, and which, though 59 feet in diameter, were thought insufficient for the weight of the intended cupola. The next architect was Baltassar Peruzzi, who, despairing of the time and money required for the completion of Bramante's design, intended to adopt a Greek cross for the plan; the edifice was under his superintendence during the pontificates of Adrian VI. and Clement VII., but it advanced very slowly, in those disturbed times. Paul III. who ascended the papal throne in 1534, employed Antonio di San Gallo, who brought the design back again to a Latin cross; a model of his intended edifice, which was made by his servant, at the cost of 4,181 crowns, may be still seen in the present church. He strengthened the supports of the intended cupola, vast as they had already become; and died in 1546.

We have now reached the period in which Michel Angelo was called in to superintend the work, he being then 72 years old. In the brief by which he received his appointment from Paul III. he was intrusted with authority to do and undo whatever he pleased; and in the same document he insisted upon the insertion of a declaration that he undertook the work for the love of God, and without any salary or reward. "Nor was this," says Mr. Woods, "a vain boast, for although Paul III. repeatedly urged his acceptance of some remuneration he invariably refused it." Michel Angelo began by producing a model of the building, according to the altered design which he intended to adopt. "There was, perhaps, a little ostentation in producing a model of the altered design, in fifteen days, and at the expense of 25 crowns; while San Gallo's model had occupied several years: but St. Peter's at this time had become a standing job, and the underlings employed in it, instead of feeling any zeal to complete it, considered an appointment in the building as an establishment for life. All this Michel Angelo endeavoured to put an end to, and excited great ill-will towards himself for so doing; but his wonderful talents and high character carried him through all opposition." Michel Angelo seems indeed to have had even a larger number of enemies than usually fell to the lot of great artists in those days; and Julius III., who succeeded Paul III. in 1550, was soon assailed from all sides with complaints of the overbearing temper of his architect, and of his determined opposition to the plans and labours of the most experienced brethren. The pope continued firm in his attachment, but Michel Angelo, despite of the countenance afforded him by a new diploma, confirming all his former powers, was so wearied by the incessant clamours and manœuvres of his enemies, that he would willingly have retired to end his days at Florence, had he consulted only his private ease. The feelings which he entertained upon the subject are often expressed in his letters to his friends; in one to Vasari he says: "My dear friend George, I call God to witness, that I was engaged against my will, and with very great reluctance, by Pope Paul III., in the building of St. Peter's ten years ago: and if the construction of that building had been followed up to the present day in the manner it was then carried on, I should now be arrived at such a point in the building, that I should turn to it with delight; but from want of money it has proceeded and still proceeds very slowly, just as it has come to the most laborious and difficult parts; so that by abandoning it now, the only consequence would be, that with excessive shame and impropriety, I should lose the reward of the fatigues which I have endured these ten years, for the love of God." He concludes, "To make you understand the consequence of abandoning the said building; in the first place, I should satisfy several scoundrels, and I should be the occasion of its falling to ruin, and perhaps of its being shut up for ever."

Michel Angelo began his labours by strengthening the four great piers, which, although they had been repeatedly reinforced, did not even yet appear to him so strong as they ought to be. He returned to the plan of a Greek cross, widened the tribune and transepts, and gave a much freer area than his predecessors had projected. "To what point he carried the work," says Mr. Woods, "I do not know; but the whole, as far as the extent of the Greek cross, seems to have been continued nearly according to his design." He died in 1563. The two small cupolas were finished by Vignola, in 1573. The great cupola was completed in 1590: Michel Angelo had raised the *drum*, or the *tambúro* as the Italians call it, that is to say, the cylindrical part, which rises to the springing of the arch of the dome. Its completion was the work of Giacomo della Porta and Domenico Fontana, who were the architects of Sextus V.; and the zeal of that pope being as great, if not greater, than that of any of his predecessors, 600 workmen were employed night and day, and the money monthly expended was 100,000 golden crowns. By this incessant labour the cupola was completed in the short space of twenty-two months,—or by the month of May, 1590; the outer covering of lead was all of the dome that remained unfinished; the lantern indeed was not yet erected.

Paul V., who occupied the papal chair from 1605 to 1621, pursued the work with equal ardour. At his accession a part of the ancient basilica was still standing; he lost no time in pulling it down, and on the 18th of February, 1608, laid the first stone of the great entrance. His architect was Carlo Maderno, who returned to the original plan of the Latin cross, and finished the body of the edifice in 1614. The great colonnade which stands in front of it was added by Bernini, under Alexander VII., who reigned from 1655 to 1667. The sacristy, which, strictly speaking, has nothing to do with the main edifice, was added so late as 1780 by Pius VI.

"How fortunate," exclaims Forsyth, "that a structure created by so many pontiffs, and the subject of so many plans, should keep its proportions inviolate, even in the smallest ornaments! Michel Angelo left it an unfinished memorial of his proud, towering, gigantic powers, and his awful genius watched over his successors, till at last a wretched plasterer came down from Como, and him we must execrate, for the Latin cross, the aisles, the attic, and the front." Mr. Forsyth is not the only person who has heaped a load of censure upon Carlo Maderno; but it is a disputed point among the critics whether the Greek cross would have been preferable to the Latin.

The reader will observe from this sketch that upwards of one hundred years elapsed before the body of St. Peter's Church was completed; and that nearly three centuries were required to bring it to its present form. In the middle of the seventeenth century, Carlo Fontana drew up an account of the building, by order of Innocent the Ninth, together with a loose estimate of its cost, not from the sums actually expended, for many of the accounts were lost,—but from the value of the materials employed. According to his calculations there had been expended upon it up to that time 47,151,450 millions of *scudi*, or about £11,625,000 of our money. This amount does not include the cost of the bronze chair of St. Peter, in which was used 219,061 lbs. of that metal, nor of the bronze confessional which contains 186,392 lbs.

THE APPROACH, COLONNADE, AND FRONT.

The Church of St. Peter stands on the left or western side of the Tiber, the great bulk of the city being on the opposite side. "There is no distant point of view," says Mr. Woods, "in which this church gives an impression of great magnificence, or from which it has the appearance of being such an immense building as it really is. This is owing to the situation, and perhaps no building of great consequence was ever so badly placed. It stands in a hollow between the Janiculan and Vatican hills which are connected by a neck behind it; so that on three sides it is surrounded by slopes, rising almost immediately from it, and about equalling the height of the nave, and in front, in spite of the large space before it, it seems encumbered with houses, which prevent a view down to the base." In fact, were it not for the dome, the buildings of the Vatican would actually overtop the church, as the reader may observe by referring to a former engraving.*

* See *Saturday Magazine*, Vol. IX., p. 121.

"The first modern structure," says Mr. Hope, "that attracted my attention was St. Peter's, that splendid basilica, built over the tomb of the prince of the Apostles, in the capital of Christendom, at the expense of all the Catholic part of Europe, which took more than a century to finish, was fabricated out of the spoil of the most splendid ancient edifices that remained, and is the most gigantic and most superb structure that the modern world can boast, or that is ever likely to rise in it.

"In the way to it I passed over the bridge of St. Angelo, decorated with statues by Bernini, that look, from the distortion of their limbs, and the flutter of their draperies, as if caught in a whirlwind; and by that still more imposing mass, once the tomb of Adrian, now the citadel of Rome, where Belisarius defended himself against the Goths, by throwing down upon them the marble statues that adorned its numerous zones.

"From that point a noble avenue should lead to the place of St. Peter's, in order to complete its magnificence—a shabby street forms the approach. When, however, the circular colonnade, the central obelisk, the two foaming fountains, casting day and night, without ceasing, a vast stream into the air, and at the further end of a gradually ascending square, the immense façade, and the proud dome of St. Peter's suddenly opens upon the sight, all former impressions vanish, and admiration only remains. But when this again begins to cool, one smiles at the Egyptian obelisk carrying the Christian cross; one regrets its pedestal, too narrow for the spread of its base; one condemns in the Church its front so much broken by partial projections, its pediment standing on a base too narrow, and an expanse too small, and rendered evidently useless by the ponderous attic that rises behind it, and crushes the façade to which it was intended to give elevation.

"Contemplating those columns of nearly nine feet in diameter, but which, formed of a masonry of small stones, only look, on a near approach, like small turrets, one cannot help casting a lingering look back on the portico of the Pantheon, and thinking that elevation of insulated columns of granite, of one single piece, though smaller in its dimensions, grander in its conceptions, and more striking in its effect, than these clusters of huge pillars, all reticulated with joints and jammed up against a wall.

"Undoubtedly the accessories to St. Peter's are fine; still they do not impress one like the vast areas that precede and lead to the imperial mosques at Constantinople, form an intermediate space between the bustle of a city and the silence of the house of God, and prepare the devout for meditation and for prayer."

The circular colonnade in front of St. Peter's is considered the master-piece of Bernini. It is composed of four rows of columns, forty feet high, and five feet in diameter, with a complete entablature; the pillars are 256 in number, and they are surmounted with 192 statues of saints, each 11 feet in height. The area which this colonnade encloses is 728 feet in length; its width at the broad end is 606 feet. In the centre rises an Egyptian obelisk, of one unbroken piece of granite, to the height of 132 feet, 48 of which are occupied by the base on which it stands; and on either side of the obelisk is a large and splendid fountain.

This colonnade is a fine erection. "It is beautiful in design," says Mr. Woods, "graceful, and even magnificent; yet magnificence is not its character. . . . The design has richness and magnificence; but it has not majesty or sublimity; and it is this want of majesty which makes one unwilling to admit its size, and communicates an appearance of uselessness." This writer expresses an opinion that the design would have been better on a smaller scale, with Corinthian columns hardly as high as the present, and ornamented Corinthian entablatures. "But you will ask me, if thus enriched and adorned, would it form a suitable approach to St. Peter's? I answer, no, nor does it now; and the proof of this is that it looks better any way than towards the church. It is more beautiful alone than united with the building it was meant to accompany."

This want of harmony with the building itself seems to be generally admitted as the great defect of the colonnade; it has great beauty, but has evidently no business to be where it is. "How beautiful the colonnades!" exclaims Mr. Forsyth, "How finely proportioned to the church! How advantageous to its flat, forbidding front, which ought to have come forward, like the Pantheon, to meet the decoration! How grand an enclosure for the piazza! how fortunate a screen to the ignoble objects around it. But, advance or retire, you will find no point of view that combines these accessions with the general form of the church. Instead of describing its whole cycloid on the vacant air, the cupola is more than half hidden by the front; a front at variance with the body, confounding two orders in one, debased by a gaping attic, and encumbered with colossal apostles. One immense Corinthian goes round the whole edifice in pilasters, which, meeting a thousand little breaks and projections, are coupled and clustered on the way, parted by windows and niches, and overtopped by a meagre attic. Yet the general mass grows magnificently out, in spite of the hideous vestry which interrupts it on one side, and the palace which denies it a point of view on the other."

The main front of St. Peter's must be examined from the area which this colonnade encloses. The common remark is that this front is more that of a palace than that of a church; it is 160 feet high and 396 wide. It consists of two stories and an attic, with nine windows to each, and nine heavy balconies awkwardly intersecting the Corinthian columns and pilasters at half of their height. The pillars of the front are 88 feet in height, including the base and capital, and eight feet in diameter; yet the whole front looks much smaller than it really is. Mr. Woods seeks the causes of this apparent diminution in the composition of the front itself, as well as in other circumstances. The breaks of the entablature have the effect of reducing the columns and pilasters into ornaments, "and one cannot imagine," as he says, "mere ornaments of such gigantic dimensions." Another cause is the division of the height into three stories, and from this arises the greater similitude which it bears to a palace than to a church. "An enormous palace is grand; but still the imagination is conducted towards the usual appearances of human life." The dimensions of an ordinary palace form the standard by which a spectator estimates the dimensions of a front which inevitably excites in his mind the idea of a palace; the stories form a scale by which he measures the whole height, and although the judgment to which he is insensibly led be the result of a misapplied proportion, still the effect is produced. "Then the attics form another story, and who wants garrets thirty feet high?" It is because nobody wants them that nobody can think them so high as they are; and a spectator, looking at the attics of the front of St. Peter's, naturally judges of their dimensions by the standard which he applies to the attics of a palace. It is from a similar cause that the colonnade looks much smaller than it is,—it is useless; "it is palpably a thing of mere ornament, not connected with or forming a part of the building, or applied to any useful purpose, and the understanding is not easily reconciled to such great masses thus employed."

There are five entrances in the front of St. Peter's. They lead into a covered portico or vestibule, the length of which extends along the whole width of the front, and beyond it at either end, so as to equal 468 feet; its width is forty feet. The true magnificence of St. Peter's, observes Dr. Burton, begins here. Mr. Forsyth speaks in high terms of this lofty vestibule, "vaulted with gilt stuccoes, and paved with various marbles, lengthening on the eye by a grand succession of doors, and niches, and statues, till it ends in the perspective statue of Charlemagne. This is one architectural picture which no engraving can flatter." The statue of Charlemagne is equestrian; it occupies the left extremity; at the right one is a similar statue of Constantine. From this vestibule five doors lead into the body of the edifice.

DESCRIPTION OF THE INTERIOR.

According to Dr. Burton, the length of the interior of this church is 609 feet from wall to wall; if the thickness of the walls and the depth of the portico be included, the length is 722 English feet. The width of the nave is 91 feet, and its height to the top of the vault is 152 feet. The length of the transepts is 445 feet. Upon the floor, which is composed of large blocks of marble of singular beauty, and disposed in various figures, are marked the lengths of some of the principal churches of Europe, as well as that of St. Peter's itself; they are given thus:—

St. Peter's	837 palms	.....	609 feet.
St. Paul's, London	710 „	.....	521 „
Milan Cathedral	606 „	.....	439 „
St. Paul's, Rome	572 „	.....	415 „
S. Sophia, Constantinople	492 „	.....	356 „

The proportion of marble is astonishing; much of it is ancient, and the varieties are of the greatest rarity and

beauty. The ceiling is composed of gilt stuccoes on a white ground. "The chief of these stuccoes," says Forsyth, "has already fallen a victim to the vanity of an old priest,—the late pope [Pius the Sixth], whose arms are carved, painted, inlaid, cast, or hammered all over St. Peter's, had long beheld with envy the middle orb of the vault, adorned with the dragon and eagle of Borghese; but dreading the imitation of his own example, he durst not supplant it openly. It therefore fell down in the dark (by accident to be sure), and was presently replaced by the armorial puff of Braschi." Braschi is the family name of Pius the Sixth.

The pilasters between the arches of the nave are not of marble but of stucco, their height is eighty-three feet, and in their recesses are statues of the founders of various religious orders. The side-aisles are about twenty-one feet in width, and opposite to each arch of the nave is a chapel recessed back from these aisles. These chapels are well worthy of observation from their splendid decorations. "Mosaic-work and the richest marbles are scattered about them with the greatest profusion, and almost all of them contain a specimen of that wonder of the art—pictures executed in Mosaic."

It is the common remark that the profusion of marble and gilding in St. Peter's is destructive of that solemnity which ought to prevail in a religious edifice. "Were I made pope," says Simond, "I would signalize my taste by daubing over the variegated marbles and gilt ceiling with one uniform tint; the mildest and least obtrusive I could find: yet would I do this only with a wash easily removable, that my pontifical successor, infallible as myself, so long as he lived, might if he pleased restore his Basilica to its wonted finery. I would also wall up three-fourths of the windows, and cover the others with a transparent warm colour, like a certain small window (the *Spirito Santo*) that I observed at the upper end of the nave; in hopes of bringing the Italian world to a proper sense of the beauty of that *dim religious light*, so becoming a place of worship, but for which they have not the least taste at present. I omitted to mention that although the interior of St. Peter's is dazzling at first sight, with the apparently universal richness of its materials, yet on near inspection I observed that much of the surface was only a brick wall, gray washed, which looks decidedly better than the parts covered with variegated marbles. On my repeated visits to St. Peter's, I always found it greater and more impressive in the evening twilight than during the day. Strangers are much struck with the mild temperature of St. Peter's; as much of the heat which finds its way into it during the course of an Italian Summer, lingers there all Winter, forming a nearly even temperature throughout the year."

Immediately under the dôme stands the *Baldacchino*, or canopy which covers the high altar, beneath which the tradition is, that the body of St. Peter reposes. This canopy is, according to some accounts, 122 feet high; and it is a common saying that its height is equal to that of the Farnese palace,—one of the loftiest in Rome. It is almost entirely of bronze, and the ornaments are chiefly gilt; "the four pillars which support it are twisted, and in other respects it is by no means in good taste, nor in unison with the majestic simplicity of the rest; but from its vast size, and the richness of the work, it can hardly fail to be admired." Near the Baldacchino, and against the last pillar of the nave, stands the statue of St. Peter, which, according to the statement of a Roman antiquary, was made by order of St. Leo, out of the bronze of the statue of Jupiter Capitolinus; its workmanship is extremely rude, "and though it is called a bronze statue," says Dr. Burton, "it has much more the appearance of iron. It is the figure which is so frequently kissed by the faithful: no Roman Catholic will pass it without going through this ceremony; and the usual form is to kiss the foot two or three times, pressing the forehead against it between each salutation; some will repeat each ceremony much oftener. The right foot projects for this purpose, and great part of it is worn away by the operation; which calls to mind the words of Cicero, in his description of a statue of Hercules at Agrigentum, 'that his mouth and chin were somewhat worn, because in their prayers and thanksgivings they were accustomed not only to worship but to kiss it.'"

The tribune contains the bronze chair, within which is said to be the identical seat used by St. Peter, and the earlier bishops of Rome. "It would be the height of temerity," says Dr. Burton, "to question the genuineness of this chair, after what Bonanni has said upon the subject. The reader may perhaps wish to see the passage, but he must not expect me to incur the penalties of it by attempting to refute it. 'This is the chair of St. Peter, which he occupied as universal pastor till he suffered death for Christ's sake. This fact has been so fully proved that the few sectaries who deny it must be most barefaced, or a set of children, and silly children too, such as Velcinus whom Rollensis has refuted, Sebastian of France, and some obscure Englishmen to be found in Saunders.' Besides the danger of classing ourselves among these our unfortunate countrymen, it would be lost labour to dispute the question after the arguments adduced by Bonanni. In the first place the miracles that have been wrought by it fully attest its apostolical antiquity. Secondly, Calvin doubted because it was made of wood, so perishable a material. 'But if this were a true ground for doubt,' says the honest Bonanni, 'the true cross and the cradle of our Saviour are made of wood, and nobody doubts about them.' It would, perhaps, have been more to his purpose to have reminded his readers, that Eusebius, who wrote in the fourth century, says that 'the episcopal chair of St. James was still shown at Jerusalem in his time.'"

The intervals between the pillars which separate the nave on either side from the aisles, are filled by twenty-four colossal marble statues, "representing the Fathers of the Church in finical attitudes, and their draperies in high flutter; the very reverse of antique simplicity." On this subject the critical observation of one of the numerous architects of St. Peter's, and the smart reply of one of the sculptors, form a standing Roman jest; "What makes your draperies fly about in this manner?" said the one. "The wind through the cracks in your walls!" answered the other. "The draperies continue to fly about although no cracks are now seen except in the cupola, rent six years ago (1811) by the shock of an earthquake which damaged many other edifices, and the Coliseum in particular. This cupola had been secured with an iron hoop bent round it; but that hoop, strong as it was, has lately been found not only broken through, but riven asunder,—an ominous circumstance this undoubtedly; and the curious who walk in St. Peter's must look to it."

On entering St. Peter's, every observer is astonished that its dimensions appear so much less than they really are. This has been considered by some as a merit, by others a defect. Dr. Burton calls it the principal excellence of the whole; "it is the beautiful adaptation of the proportions, which distinguishes this edifice from every other. Accordingly there are many objects which seem small, or only of the common size, which are really far above it. As an instance of this, the two angels may be mentioned, which support the fonts on the first pillars of the nave: they have the appearance of representing children, but are really larger than the natural size of a man. So also the dove with an olive-branch in its mouth, which occurs so frequently in this cathedral, (being the arms of Innocent the Tenth, Pamfili,) and forms an ornament on each of the pillars of the nave, seems to be easily within reach of every person, but can with difficulty be reached by the hand of the tallest."

"After all the abuse," says Mr. Woods, "which has been bestowed on the building for looking little, and all the absurd admiration it has obtained for this defect, the spectator must perceive at once that he is in the largest, far the largest room he ever saw, and if he have any sentiment in the art, he must feel the strong impression of a most noble and magnificent piece of architecture:—of one, where the richness of the material is combined with justness of proportion, and where science, taste, and genius have united with riches and power to produce sublimity. For my own part I was indeed on my own guard against the deception, but it seemed to me to be impossible that any one should seriously believe the cupids or angels at the font to be no bigger than little children, or suppose the doves mentioned by Eustace to be of the natural size*."

Mr. Woods, however, admits that the interior does look smaller; but instead of ascribing it to the excellence of the proportions, he tells us that "a great part of the secret lies in a single word,—disproportion." This view is supported by a critic in the *Quarterly Review*, who observes that upon a very little consideration it must appear a most extraordinary error to regard the apparent diminution as a merit: "If indeed it be owing to the proportions of St.

* "The figures of the Evangelists," says Mr. Mathews. "which decorate the inside of the cupola, do not appear larger than life; and yet the pen in St. Mark's hand is six feet long, from which we may calculate their real stature."

VIEW OF THE INTERIOR OF ST. PETER'S.

Peter's, that it appears less than it is, this must be considered as a proof, not that its proportions are exactly what they ought to be, but that there is something wrong about them; for its magnificent dimensions are generally and justly regarded as one fit cause of our admiration, and therefore that must be thought a defect which conceals their immensity. If, on the other hand, it be a merit in the proportions of St. Peter's that they diminish to the eye its real size, then, that size must be a defect, and the expense and labour of producing it must have been more than wasted. In truth, however, we doubt altogether the justness of the theory, which attributes to the general proportions of a building, unassisted by its darkness or lightness, the power of diminishing or augmenting the whole magnitude of a building. We think the true cause of the apparent diminution of St. Peter's, in part at least, may be the great magnitude of the numerous statues in the church. These are, in fact, all colossal, and as our eye is accustomed to statues more near the size of life, they serve as a false standard, by which we measure the church in which they stand. We suspect also that statues of white marble have, from their brilliancy of colour, the appearance of being much nearer the eye than they really are, which must of course diminish their apparent magnitude, and render the scale afforded them still more fallacious. The great light of St. Peter's, especially when contrasted, as it will be involuntarily by all foreigners, with the gloominess of their own Gothic cathedrals, contributes to the same effect of reducing its seeming dimensions."

GENERAL APPEARANCE OF THE INTERIOR.

"A NOISY school for children in one corner; a sermon preached to a moveable audience at another; a concert in this chapel; a ceremony half interrupted by the distant sounds of the same music in another quarter; a ceaseless crowd sauntering along the nave, and circulating through all the aisles; listeners and gazers walking, sitting, kneeling; some rubbing their foreheads against the worn toes of the bronze St. Peter, others smiling at them; confessors in boxes absolving penitents; *laquais de place* expounding pictures; and all these individual objects and actions lost under an artificial heaven, whose grandeur and whose beauties delight and distract the eye. Such is the interior of this glorious edifice,—the Mall of Rome; but religious sentiments are perhaps the last which it inspires."

"The view of the interior of St. Peter's" says Mr. Williams "is perhaps, the best near the bronze statue of St. Peter. We saw it under the most striking effect, adorned with the beams of the sun, playing upon its gorgeous magnificence,—the noble dome with its various colossal paintings in Mosaic, of angels, prophets, and apostles, the latter, in the spandrils, at least twenty-five feet in height. In the transept of the cross are seen the noble sepulchral monuments of the popes, by Canova, Bernini, Michel Angelo, and others; splendid pictures in Mosaic, designed by Raffael, Domenichino, Guercino, and Guido, scarcely distinguishable from the finest paintings; grand columns of marble, porphyry, and granite, the gigantic supporters of the dome, each of which, were it hollow, would contain hundreds of people. Numerous colossal statues of saints, in niches at least thirteen feet high; the various and precious stones which impanel the walls of the whole building; the richness of the ornamented roof; the galleries from which the relics are occasionally exhibited; the great altar of Corinthian brass, by Bernini, (the height of which is not less than that of the highest palace in Rome,) with its twisted columns wreathed with olive; the hundred brazen lamps continually burning, and surrounding the tomb of the patron saint, with its gilded bronze gate, enriched to the utmost with various ornaments; the massive silver lamps; the hangings of crimson silk; the chair of St. Peter, supported by two popes, statues of great magnitude; the pavement, composed of the most rare and curious marbles, of beautiful workmanship; the statue of St. Peter, with a constant succession of priests, and persons of all descriptions kissing his foot;—form a whole not to be paralleled on earth: especially when seen as I saw it, with the sun's beams darting through the lofty windows of the dome, throwing all into mysterious light, tipping the gilded and plated ornaments, and giving additional richness to

the colours of the Mosaic paintings, and to the burnished silver lamps, which sparkled like little constellations; while the effect of all was heightened by the sound of the organ at vespers, swelling in notes of triumph, then dying upon the ear, and sinking into the soul; the clear melodious tones of the human voice, too, filling up the pauses of the organ, diffusing a deeper solemnity through this great temple, and making us feel an involuntary acknowledgement to God, who had gifted man with such sublime conceptions."

The inside of St. Peter's has fewer faults than the outside. "One is astonished," says Mr. Hope, "to find so much splendour, and even glitter, united with such an air of repose, of majesty, and of quiet. There is a serenity of look, and an equability of temperature in this vast edifice, which throws over all its parts an inexpressible charm; and in many of its finishings, by peculiar good luck, have been avoided a number of blemishes in architecture, that were in high vogue, at the time it was finished. One wonders, for instance, how its ceiling should have escaped allegorical paintings. Bernini, however, who had the worst taste of any man who ever acquired the reputation of a great artist, was still in time to exhibit some of his wretched conceits. Treating the adorning of the first church of Christendom in the same tawdry flippant style as he would have done that of a temporary stage, he contrived not only to introduce at one end of the vestibule a theatrical exhibition of Constantine starting at the vision of the cross, but to place in the central point of the church a transparency of the Holy Ghost, surrounded by a glory of rays of plaster gilt. Yet such is the immensity and splendour of St. Peter's that this defect and that of the twisted columns of the altar-piece, and a hundred others, are absorbed in the galaxy of beauties with which they are mingled.

"Yet has not St. Peter's, among all its magnificence, above one or two excellent works of art. Michel Angelo has left his name on a small and pitiful Pietà: Algardi has intrusted his celebrity to an immense bas-relief which imitates a painting, and consequently fails in its effect; and on every side you see gorgeous mural monuments, which being neither mere decorations of walls, nor positive sarcophagi, encroaching too much for the former, and too little detached and fanciful for the latter, have not the imposing appearance of the most uncouth Gothic tomb. Among these, however, that of Paul the Third, by Guglielmo della Porta is much spoken of, and that of Pope Rezzonico by Canova deservedly admired. To judge of the size of this enormous pile, two hundred feet longer, and a hundred feet higher, than St. Paul's, one should ascend the cupola, and look down upon the inside. It is here that, suspended over an immense abyss, not hollowed out by the potent hand of nature, but formed by the slow manual operation of man, that man himself looks like an insect creeping within his own work."

The feelings excited by this edifice in a religious mind will be of a very mixed character, and at times of a tendency most painful. The vastness, the symmetry, the beauty and lightness, of the architecture, impart to it "a character of loftiness and perpetuity," perhaps unequalled by any other edifice; yet to some it may seem the "presence-chamber of the monarch of the world, rather than the scene which a sinner would select in order to meet his God." "From this temple of high beauty and exquisite skill," to use the words of an eloquent writer, "have any waters issued forth to heal the sickly places of the moral wilderness? Alas! is it not here that the slumbers of the soul are the most entire,—that the despotism of ignorance is the most cruel,—that the degradation of the intellect is lowest, and the darkness of the heart the most unbroken and profound? Is it not here that the deep warning falls the loudest upon the startled ear? 'Woe unto thee Chorazin! woe unto thee Bethsaida! for if the mighty works which were done in thee had been done in Tyre and Sidon, they would have repented long ago in sackcloth and ashes. Verily I say unto you, It shall be more tolerable for Tyre and Sidon in the day of judgment than for thee.'"

"How perfect a contrast of feeling," exclaims the same writer, "have I experienced sometimes, when standing within that majestic edifice of St. Peter's! This hour, the quietness, the warmth, the beauty, the fragrance, the light, the solitude, the vastness of the scene, have placed me in an element with which earth has been scarcely connected. I have felt detached from all human and immediate interests. The presence of God has cheered my spirit, and united me to all the lofty objects of eternity. The love and grace of the great Saviour and benefactor have carried their ineffable consolations to my heart: and I have longed for the wings of a dove, that I might fly away and be for ever at rest. The next hour, the scene has been wholly changed. I have seen the multitude kiss the image which was that of Jupiter, and is that of St. Peter; I have heard the addresses to God in a language which the people cannot understand; I have considered the repugnance of the government to education; the jealousy with which the diffusion of the Scriptures is regarded; and all the previous enchantment has vanished from my mind. I have been compelled to turn from the magnificence of art, from the beauty of sculpture, from the lofty aspirations of an outward edifice, from the balmy breath of a fragrant atmosphere, from the fine emblems of heaven and eternity, to the appalling consideration, that the beams of truth have feebly irradiated these walls; that the chillness of a moral death reigns eternally within them; that the very structure which had given the former enchantment to my senses and my heart, owes its existence to the ambition and despotism of human crime, and that in very truth, these magnificent buildings are, in the words of an energetic writer, 'as triumphal arches, erected in memorial of the extermination of that truth, which was given to be the light of the world and the life of men!' How fearful is the consideration, that all the best faculties of the mind and the hand have thus been seized by a foreign force, and made instrumental against the happiness of their possessors, and against the glory and authority of Him who called them into existence." "If," exclaims another writer, "we could imagine a momentary visit from Him, who once entered a fabric of sacred denomination with a scourge, because it was made the resort of a common traffic,—with what aspect and voice,—with what infliction, but the 'rebuke with flames of fire,' would he have entered this mart of iniquity, assuming the name of his sanctuary, where the traffic is in the delusions, crimes, and the souls of men. It was even as if, to use the prophet's language, the very 'stone cried out of the wall,' and the 'beam out of the timber answered it' in denunciation; for a portion of the means of building was obtained as the price of dispensations and pardons."

THE DOME.

—— The dome, the vast and wondrous dome,
To which Diana's marvel was a cell.

It is usually said to have been the boast of Michel Angelo that he would elevate the Pantheon in the air. "Whatever merit may attach to this idea, is certainly due to Bramante, since the cupola designed by him was certainly in pendentive, while that of Brunelleschi, at Florence, bears perpendicularly on its foundations. Perhaps to put it upon stilts would have been a more correct expression, and it is certainly better on the ground." "To be convinced of this," says Mr. Woods, "it is only necessary to mount into the gallery, and observe how much superior it appears in size and beauty than when seen from below."

The dome of St. Peter's is double,—that is to say, there are in fact two domes, an inner and an outer one; between the two is the staircase leading to the summit. The diameter of the internal dome is 140 feet, of the external dome, 195 feet. From the cornice immediately above the pillars to the aperture of the lantern the distance is 170 feet, from thence to the top of the cross, 110 feet; the height of the supporting piers themselves, is 178 feet, so that the total elevation of the top of the cross above the pavement of the church is 458 feet.

Much alarm has been felt at different times for the stability of the cupola of St. Peter's. Towards the end of the seventeenth century it was reported that the dome was about to give way, but on being examined it was found that there was no cause for reasonable alarm. In 1742 the report again prevailed; mathematicians and architects were called in, and gave conflicting opinions. There are now several bands of iron in the cupola; two were affixed when it was at first raised. There are cracks all round the drum, and according to Mr. Woods, they denote some enlargement in that part from the expansion of the dome. "But, in spite of all the iron ties, the cracks in the buttresses are the most important, and from their direction, almost uniformly outward and downward, indicate a settlement of the whole drum upon the pendentives, while the columns, resting upon the direct arches of the nave, have retained, or nearly retained, their position. The great piers have therefore probably gone outward, and when in the building, by bringing my eye carefully, so as to compare

the angle of a pilaster, not affected by this operation, with those of the central cupola, I think I can perceive that such an effect has taken place. Nor has the movement entirely ceased, since a dovetailed piece of marble, inserted to ascertain the fact in 1810, was found broken in 1825. Perhaps there never was any just ground of alarm: yet, as one of the iron circles, intended to contain the thrust had given way, there probably had been a considerable settlement, but not more than might have been expected, from the different periods in which the work had been carried up, and the repeated strengthenings which the solids had received. Nevertheless it was determined to insert five bands of iron, which were all let into the masonry, and made tight and sound under the direction of Vanvitelli. The broken chain was restored: but the other chain had been originally inserted in the thickness of the wall: this there was no opportunity for examining: in order to be perfectly secure, a sixth band was inserted in its neighbourhood, so that, in all probability, the dome and its drum are now secured by eight iron bands, five of which are in the drum, one at the springing of the arch, and two on the surface of the dome itself. It is doubted among the Italian architects whether the insertion of all these bands did not do more harm than any strength they could afford to the building can compensate." Dr. Burton says that the cupola of the Duomo, at Florence, has cracked even worse than that of St. Peter's; yet no iron bands have been inserted into that.

The ascent to the roof of St. Peter's is very easy. "You will stare," says a modern writer, "when I tell you that a broad paved road leads up to the top of St. Peter's, not, perhaps, practicable for carriages from its winding nature, but so excellent a bridle-road, that there is a continual passage of horses and mules upon it, which go up laden with stone and lime; and the ascent is so gentle, and the road so good, that any body might ride up and down with perfect safety." When the visiter reaches the leads on the roof, the immensity of the building appears very striking; "small houses and ranges of workshops for the labourers employed in the never ending repairs are built here, and are lost upon this immense leaden plain, as well as the eighteen cupolas of the side chapels which are not distinguishable from below." From this roof staircases lead to the ball, which is twenty-four feet in circumference, and is said to be capable of containing eighteen persons. From the balustrade on the outside of the ball, the adventurous sometimes mount to the bottom of the cross by an iron ladder, which is in part quite perpendicular.

ILLUMINATIONS OF ST. PETER'S.

It is the custom upon some occasions, and particularly on the eve of the festival of St. Peter, in the month of June, to light up the exterior of this enormous edifice. Simond gives a lively description of the scene and the preparations. "Soon after sunset the whole outside of St. Peter's was occupied, I might say, hung, with workmen, who were seen climbing in all directions, along the ribs of the dome, the lantern above it, the gilt globe, and the very cross at the top of all. The pediment in front, the architecture, the colossal statues, the very acanthus-leaves of the Corinthian capitals, swarmed with adventurous men, carrying lights, who, by means of ropes, slided and swung with great rapidity and ease from one point to another of the edifice, forcibly recalling to my mind the fireflies of America, on a hot Summer's evening. We understood that these men hear mass, confess, and receive the absolution before they begin, on account of the great risk they run of breaking their necks. The business being well organized, the whole surface of St. Peter's and the colonnade before it, soon shone with the mild effulgence of fifty thousand paper lanterns; but in less than an hour, and at a particular signal, a great change of scene took place; the whole edifice burst at once, as by magic, into absolute flames. This is done by means of pans full of pitch and pine shavings set on fire, and simultaneously thrust out from all parts of the edifice: the effect is quite wonderful, but of short duration. It was scarcely over before the crowd moved off towards the river, crossing the bridge, in order to occupy a situation in front of the castle of St. Angelo, and we did not without difficulty, reach the house on the top of which we had provided places. I certainly never saw fire-works at all comparable with these, for their inexhaustible variety,—their force, loudness, and duration. The huge mass of the castle seemed a volcano, pouring its ceaseless deluge of fire above, below, and all around; and the Tiber in front seemed itself a sheet of fire. Long after all this had ended, St. Peter's (forgotten for a while) continued to shed its mild lustre over the darkness of a cloudy night. The next day Rome appeared a desert, and the universal silence was only disturbed by the distant rattling of travelling carriages posting away to the north and to the south."

CHURCHES OF MODERN ROME.

It would far exceed our limits to describe even the principal of the many magnificent churches which, besides St. Peter's, are to be found in Rome; the whole number is said to be 365. We shall content ourselves with some remarks on their general style and appearance. One of the most remarkable of their characteristics is of a negative kind,—the almost total absence of the Gothic or pointed style of architecture; with the exception of a few fragments and a few ornaments in this style, nothing of it is to be seen. "The Roman architects," says Dr. Burton, "have invariably studied the Grecian models, and whatever fault may be found in separate parts, it must be allowed that the churches of this city present some of the most splendid specimens of architecture which can be found in modern times."

Forsyth says that they are admirable only in detail. "Their materials are rich, the workmanship exquisite, the orders all Greek. Every entablature is adjusted to the axis of each column, with a mathematical scrupulosity which is lost to the eye. One visionary line runs upward, bisecting, superstitiously, every shaft, triglyph, ovolo bead denticle, mutile modillon, or lion's mouth, that lies in its way. But how are those orders employed? In false fronts which, rising into two stages of columns, promise two stories within—in pediments under pediments, and in segments of pediments—in cornices, for ever broken by projections projecting from projections—in columns, and pilasters, and fractions of pilasters, grouped round one pillar. Thus Grecian beauties are clustered by Goths: thus capitals and bases are coupled, or crushed, or confounded, on each other; and shafts rise from the same level to different heights, some to the architrave, and some only to the imposts. Ornaments for ever interrupt or conceal ornaments: accessories are multiplied till they absorb the principal: the universal fault is the too many and the too much. Few churches in the city show more than their fronts externally. Their rude sides are generally screened by contiguous buildings, and their tiled roof by a false pediment, which, rising to an immoderate height above the ridge, leads you to certain disappointment when you enter. Every front should be true to the interior. Such was the front of the ancient temples, a pediment resting on a peristyle and forming a fine pentagon: but such a figure would be too flat for those vaulted churches, and incompatible with their aisles.....The Romans seem fondest of those fronts where most columns can be stuck and most angles projected. Some, as Santa Maria in Portico, the Propaganda Fide, &c., are bent out and in like brackets. Quadrangular fronts, like those of St. Peter's, the Lateran, &c., are fitter for a palace than for a church. How specifically truer is the old Gothic front, which admits but one large window, similar in form to the front itself!"

"The principal churches of Rome," says the same writer, "however different their style of building and ornament may be, are distributed in the same manner. Their aisles are generally formed by arcades: over these are sometimes grated recesses, but never open galleries. The choir terminates in a curve, which is the grand field of decoration, and loaded with curiosities and glories in brass and marble. The high altar stands in the middle of the cross. The chapels of the Holy Sacrament and of the Virgin are usually in the transepts. Those of the saints are ranged on the sides; and each being raised by a different family, has an architecture of its own, at variance with the church, which thus loses its unity amid nests of polytheism."

Among the churches of modern Rome there are seven which are called basilicas, and are supposed to possess a peculiar sanctity. The name *basilica* is derived from the circumstance of their being generally formed out of the *basilicæ* of ancient Rome, which have been already mentioned. These seven are St. Peter's, Sta. Maria Maggiore, St. John Lateran, and Sta. Croce in Gerusalemme,—which are within the walls,—and St. Paul's, S. Lorenzo, and St. Sebastian's, which are without them. The reason assigned for the preference is the following. Upon a certain occasion the four patriarchs of Alexandria, Antioch, Jerusalem, and Constantinople, came to Rome; and four principal churches were assigned to them during their

residence. These were St. Paul's, Sta. Maria Maggiore, S. Lorenzo, and St. Peter's. The pope, who was superior to them all, reserved for himself St. John Lateran, which was then, and is still, higher in rank than St. Peter's, being in fact, the metropolitan church of Rome, and "the principal temple of the Catholic world," as Vasi says. This circumstance imparted a peculiar sanctity to the five churches, and the people frequented them more than any others. St. Sebastian and Sta. Croce were subsequently added to the number, because in going from St. Paul's to the Lateran, it was necessary to pass by St. Sebastian, and in continuing the visitation from the Lateran to S. Lorenzo, Sta. Croce had the like good fortune to be in the way. "Such," says Dr. Burton, "is the reason assigned by an antiquary and dignitary of the Romish church, which, perhaps will not seem very satisfactory."

RELICS OF PAGANISM IN MODERN ROME.

MIDDLETON, in his celebrated *Letter from Rome*, after expressing the resolution which he had taken to employ himself, during his stay in the capital, chiefly in observing its antiquities, and to lose as little time as possible in taking notice of the fopperies and ridiculous ceremonies of the present religion of the place, goes on to say, "But I soon found myself mistaken; for the whole form and outward dress of their worship seemed so grossly idolatrous and extravagant beyond what I had imagined, and made so strong an impression on me, that I could not help considering it with a particular regard; especially when the very reason which I thought would have hindered me from taking any notice of it at all, was the chief cause which engaged me to pay so much attention to it: for nothing, I found, concurred so much with my original intention of conversing with the ancients; or so much helped my imagination, to fancy myself wandering about in *old heathen Rome*, as to observe and attend to their religious worship; all whose ceremonies appeared plainly to have been copied from the *rituals of primitive paganism;* as if handed down by an uninterrupted succession from the *priests of old* to the *priests of new Rome;* whilst each of them readily explained and called to my mind some passage of a classic author, where the same ceremony was described as transacted in the same form and manner, and in the same place where I now saw it executed before my eyes: so that as oft as I was present at any religious exercise in their churches, it was more natural to fancy myself looking on at some solemn act of idolatry in old Rome, than assisting at a worship instituted on the principles and framed upon the plan of Christianity."

"Many of our divines," he adds, "have, I know, with much learning and solid reasoning charged and effectually proved the *Crime of Idolatry* on the Church of Rome; but their controversies, (in which there is still something plausible to be said on the other side, and when the charge is constantly denied, and with much subtilty evaded,) are not capable of giving that conviction which I immediately received from my senses; the surest witnesses of fact in all cases; and which no man can fail to be furnished with who sees *popery* as it is exercised in Italy, in the full pomp and display of its pageantry; and practising all its arts and powers without caution or reserve. The similitude of the popish and pagan religion seemed so evident and clear, and struck my imagination so forcibly, that I soon resolved to give myself the trouble of searching to the bottom; and to explain and demonstrate the certainty of it, by comparing together the principal and most obvious parts of each worship." He then expresses an opinion that he shall have matter enough to tire both himself and his correspondent, "in showing the source and origin of the popish ceremonies, and the exact conformity of them with those of their pagan ancestors." We select his remarks on the use of incense:—

"The very first thing that a stranger must necessarily take notice of, as soon as he enters their churches, is the use of *incense* or *perfumes* in their *religious offices;* the first step which he takes within the door will be sure to make him sensible of it, by the offence that he will immediately receive from the smell as well as smoke of this *incense*, with which the whole church continues to be filled for some time after every solemn service,—a custom received directly from *paganism;* and which presently called to my mind the old descriptions of the *heathen temples* and *altars* which are seldom or never mentioned by the antients without the epithet of *perfumed* or *incensed.*

"In some of the principal churches, where you have before you in one view, a *great number of altars*, and all of them smoking at once with *steams of incense*, how natural is it to imagine oneself transported into the *temple of some heathen divinity*, or that of the *Paphian Venus* described by Virgil?

> Her hundred altars there with garlands crown'd,
> And richest incense smoking, breathe around
> Sweet odours," &c.

Under the *pagan emperors*, the use of incense for the purpose of religion was thought so contrary to the obligations of *Christianity*, that in their persecutions the very method of *trying and convicting a Christian was by requiring him only to throw the least grain of it into the censer, or on the altar.*

Under the *Christian emperors*, on the other hand, it was looked upon as a *rite* so peculiarly *heathenish*, that the very *places or houses* where it could be proved to have been done, were by a *law* of Theodosius *confiscated to the government.*

The Rev. Mr. Blunt, in his *Vestiges of Ancient Manners and Customs, &c.*, points out several marks of resemblance between the ancient and the modern superstition. Not the least curious is the analogy which may be observed between the names of the pagan temples of Ancient Rome, and the Catholic churches of Modern Rome. Of temples, there are said to have been formerly in Rome four hundred and twenty sacred to the pagan gods; of churches there are now in the modern city and its suburbs, upwards of a hundred and fifty sacred to Christian saints. "And as heretofore many temples," to use the words of Mr. Blunt, "were consecrated to the same deity under different titles, so now are there many churches devoted to the same saint, or to the Madonna, distinguished only by a diversity of epithets." Thus in Ancient Rome, there was a temple of Jupiter Castor, of Jupiter Feretrius, of Jupiter Sponsor, of Jupiter Stator, of Jupiter Tonans, of Jupiter Victor, &c., of Venus Calva, Venus Capitolina, Venus Erycina, Venus Cloacina, Venus Victrix. So in Modern Rome we find a church of Santa Maria degli Angeli, Santa Maria di Araceli, Santa Maria Imperatrice, Santa Maria Liberatrice, Santa Maria della Consolazione, Santa Maria Egyptiaca, Santa Maria dell' Anima, &c.; S. Pietro in Vaticano, S. Pietro in Montorio, S. Pietro in Vincoli, S. Pietro in Carcere, &c. Again, the heathen temples were often dedicated to two divinities, as to Castor and Pollux, to Venus and Cupid, to Venus and Rome, to Honour and Virtue, to Isis and Serapis, &c. In like manner, there are now churches to SS. Marcellinus and Peter, to Jesus and Maria, to Dominicus and Sistus, to Celsus and Julianus, to SS. Vincentius and Anastasius. Upon this same point we refer the reader to the remarks which we quoted from Middleton's *Letter*, in our description of the Pantheon, which from being formerly dedicated to all the gods of pagan Rome, is now dedicated to all the saints of Catholic Rome.

Mr. Matthews remarks, that some traces of the old heathen superstitions are constantly peeping out from under their Catholic disguises. "What is the modern worshipping of saints and images but a revival of the old adoration paid to heroes and demi-gods;—or what the nuns, with their vows of celibacy, but a new edition of the vestal virgins? Wherever we turn, indeed, 'all is old, and nothing new.' Instead of tutelary gods, we find patron saints and guardian angels, and the *canonization* of a saint, is but another term for the *apotheosis* of a hero..... The very same piece of brass which the old Romans adored, now with a new head on its shoulders,—like an old friend with a new face,—is worshipped with equal devotion by the modern Italian.

"It is really surprising to see with what apparent fervour of devotion, all ranks, and ages, and sexes, kneel to, and kiss, the toe of this brazen image. They rub it against their foreheads, and press it against their lips, with the most reverential piety. I have sat by the hour to see the crowds of people who flock in to perform this ceremony,—waiting for their turn to kiss;—and yet the Catholic would laugh at the pious Mussulman who performs a pilgrimage to Mecca to wash the holy pavement, and kiss the black stone of the Caaba;—which, like his own St. Peter, is also a relic of heathenism."

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CHESTER CATHEDRAL.

CHESTER CATHEDRAL.

IN the old edition of *Britain*, by Camden, of the date of 1610, is the following spirited passage relative to this Cathedral:—

About the year of our Redemption, 1094, when, as in a devout and religious emulation, princes strove that cathedral churches and minsters should be erected in a more decent and seemly form; and when Christendom roused, as it were, herself, and casting away her old habiliments, did put on everywhere the bright and white robe of the churches, Hugh, the first of the Norman blood that was Earl of Chester, repaired the church which Earl Leofric had formerly founded in honour of the Virgin, St. Werburga; and, by the advice of Anselm, whom he had procured to come out of Normandy, granted the same unto monks. And now it is notorious for the tomb of Henry the Fourth, emperor of Almaine*, who, as they say, gave over his empire, and lived here an eremite's† life, and for the Bishop's See therein established; which See, immediately after the Norman Conquest, Peter, Bishop of Lichfield, translated from Lichfield hither; but when it was brought to Coventry, and from thence into the ancient seat again, West Chester‡ lay a long time bereft of this episcopal dignity, until, in our father's days, King Henry the Eighth, having thrust out the monks, ordained prebendaries and restored a bishop again, under whom, for his diocese, he appointed this county, Lancashire, Richmond, &c., and appointed the same to be within the province of York. At its first foundation it was in the province of Canterbury.

Camden having supplied us with this concise history of the See of Chester, we may proceed to give some description of the fabric. The Cathedral consists of the following parts; a nave and choir, separated from their respective aisles by clustered columns; a central tower, resting on four massive piers; transepts; and a lady-chapel to the east. The western entrance is by a pointed doorway, from which two descents by steps lead into the nave. On one side is the Bishop's consistory court, on the other an entrance to the Bishop's palace. These were intended to have formed the bases of two western towers, and the foundation of them was laid with much ceremony by Abbot Birchenshaw in 1508. The south porch of the church is in the style of the same period. The transepts are of very unequal proportions, being uniform neither in size nor appearance. The north transept has an ornamented oak roof, supported by angels, bearing emblems of the crucifixion. At the south-east angle of this transept is an ancient vestry. The south transept, which is by far the larger of the two, is used as the parish-church of St. Oswald. In the Choir, opposite to the pulpit, is the stone case which formerly surrounded the shrine of St. Werburgh, now shortened, and used as the bishop's throne. It exhibits a rich specimen of Gothic architecture, in the style of the early part of the fourteenth century. Under the east window of the Choir is an arch, opening to the Lady-chapel.

The Cloisters, the general style of which is that of the fifteenth century, are situated on the north side of the nave, and form a quadrangle of about 110 feet square; the centre formerly contained a cistern for water, which was brought in pipes from Christleton. These cloisters originally consisted of four vaulted walks, of which the south walk is destroyed. In the church-wall, in the south walk, are six semicircular arches, resting on short pillars; the three eastern ones have ornamented pillars; these mark the places of burial of the Norman abbots. The west walk opens to the nave by an early Norman arch at the south end; and by another, now closed, it formerly opened to a passage leading to the great square of conventual buildings. Another doorway, opposite to the south walk, closed by a pillar placed before it to support the present vaulting, led to an arched passage, forming the abbot's way to the church. Along the rest of this walk extends a kind of crypt, consisting of a double row of circular arches. The north walk contained the chief entrance into the refectory of the convent, under a rich semicircular arch; and at the east end was a doorway leading to the kitchen and its offices, and to the staircase of the dormitory. Along the greater part of the north side ran the refectory, a noble apartment, ninety-eight feet in length and thirty-four in height, with a roof of oak, resting on brackets, which was removed in 1804. The Chapter-house, the entrance to which is from the east side of the cloister, extends eastward, parallel with the choir of the church. Some portions of this interesting cathedral are assigned to the eleventh century. The north aisle of the choir, the chapter-house, and the ancient refectory, are said to belong to the early part of the thirteenth century. The central tower is stated to have been finished in 1210.

The length of the Cathedral from east to west, is three hundred and forty-eight feet; the width of the Choir and Nave is seventy-four feet six inches.

Chester Cathedral suffered great injury during the civil wars, and continued in a very dilapidated state till 1656. At the time the unfortunate Duke of Monmouth was in the city, the mob forced the doors, and destroyed most of the painted glass: they also injured the font, and some of the monuments, and committed several other outrages.

Before the Reformation this church was governed by abbots, of whom John Clarke, elected about 1537, may be reckoned the twenty-seventh abbot. Little more is known of him, than that he readily complied with the wishes of King Henry the Eighth in surrendering the monastery at the dissolution, in consideration of which he was suffered to retain the government of the dissolved abbey, under the character of dean of the new cathedral.

The diocese of Chester is of great extent; but, in pursuance of the regulations recommended by the Ecclesiastical Commissioners, it will be relieved of a large portion of territory. The deaneries of Richmond, Catterick, and Boroughbridge, and part of the deanery of Kirkby Lonsdale, have been taken out of it, to constitute the greater part of the see of Ripon. It is also to lose the whole of the county of Lancaster, which, with the exception of the deanery of Furness, will go to form the see of Manchester; this latter deanery being assigned to the diocese of Carlisle. The archdeaconry of Salop, from the diocese of Lichfield, is, however, to be added to Chester.

Among the most eminent of the bishops of Chester, since the foundation of the episcopate by King Henry the Eighth, may be mentioned the following.

BRIAN WALTON, D.D., Cambridge, the editor of the great Polyglott Bible, was born at Cleveland, in Yorkshire, in 1600. He became rector of St. Martin Orgars, in the city of London, and in 1635 was appointed to the living of St. Giles'-in-the-Fields. He was a learned divine and an excellent lawyer; but, being true to the church and king, he was obliged, on the breaking out of the civil war, to quit his preferment for fear of being murdered. Having fled to Oxford, he was incorporated of that University, and soon formed his noble project of preparing the Polyglott Bible, which, however, was finished during the Commonwealth, at the house of Dr. Fuller, his father-in-law, in London. This

* *Germany.* † *Hermit's*, from a Greek word signifying a desert.

‡ Chester received its name from *Castra*, the Latin word for a camp; the Roman legions having frequently encamped in this neighbourhood, and particularly the famous *twentieth* legion, called the *victorious*, which was placed here by Galba. Chester was often called *West Chester*, from its western situation in the county.

splendid work, which, while it reflected honour upon its learned editor and his coadjutors, was also a credit to the English press, was published in 1657, in six volumes folio, the sacred text being printed in the Hebrew, Syriac, Chaldee, Samaritan, Arabic, Æthiopic, Persian, Greek, and Latin languages. The preface, which was originally intended for Cromwell, and contained allusions to the Protector, was altered to suit the new reign. The *republican* copies are far more scarce than the *royal*; but the possessor of either edition may be proud of owning such a treasure. In September, 1661, Walton was presented to the bishopric of Chester, and on the 11th of that month was installed with great ceremony; "A day," says Wood, "not to be forgotten by all the true sons of the Church of England." But his honours were short-lived; he died in Aldersgate-street, London, in the November following, and was buried in St. Paul's Cathedral.

John Wilkins, D.D., Oxford, was the son of a goldsmith, and was born in 1614, at Fawsley, near Daventry. Having taken orders, he became chaplain to Lord Say, and then to Charles, Count Palatine of the Rhine. Upon the breaking out of the civil war he joined the parliament, and took the oath of the solemn League and Covenant. The committee of parliament for reforming the University made him warden of Wadham. He afterwards married Mrs. French, a widow, sister of Oliver Cromwell; and though ejected at the Restoration from the mastership of Trinity College, Cambridge, to which he had been appointed in 1659 by Richard Cromwell, he soon became preacher at Gray's Inn, and rector of St. Lawrence, Jewry. About this time he was chosen one of the council of the Royal Society, and, in consequence of his great mathematical and scientific attainments, proved a highly valuable member of that distinguished body. He soon rose to be Dean of Ripon, and subsequently Bishop of Chester, the latter elevation being secured for him by the interest of Villiers, Duke of Buckingham, whose patronage was not considered creditable to him. He died at the house of Dr. Tillotson, in Chancery-lane, London, in 1672. Wilkins's works are very ingenious, and some of them more entertaining than useful. When twenty-five years of age he published a whimsical little book, entitled "*The Discovery of a New World*; or a discourse tending to prove, that there may be another habitable world in the moon, with a discourse concerning the possibility of a passage thither." He was the inventor of the Perambulator, or Measuring-Wheel. Of his theological works the principal was his *Discourse on Natural Religion*, published after his death by Tillotson.

John Pearson, D.D., Cambridge, "in all respects the greatest divine of his day*," celebrated for his admirable *Exposition of the Creed*, was born at Snoring, in Norfolk, in 1612. From Eton school, he proceeded to King's College, Cambridge, and took orders in 1639. Having been chaplain to Finch, Lord Keeper of the Great Seal, he was presented to the living of Torrington, Suffolk. In 1650 he was made minister of St. Clement's, Eastcheap, London, where he preached the substance of his *Exposition of the Creed*. This noble work has gone through many editions: it is in itself a body of divinity, deep, clear, and accurate, and may well be consulted by the general reader, as well as by the student of theology; to the latter it is indispensable. Having passed through various stages of preferment, Pearson succeeded Dr. Wilkins in the see of Chester in 1673. He died at Chester in 1686. Dr. Bentley, the famous scholar and critic, used to say, that Bishop Pearson's "very dross was gold."

* Bishop Burnet.

Sir William Dawes, Bart., D.D., Oxford and Cambridge, a most excellent person, was born in 1671, and received his early instruction at Merchant Tailors' School, from whence he obtained a Scholarship, and afterwards a Fellowship, at St. John's College, Oxford. But his father's title and estate descending to him, he settled at Catherine Hall, Cambridge, of which college, after taking orders, and obtaining his Doctor's Degree, he was appointed Master. Through his interest with Queen Anne, he obtained an act of parliament for annexing a Prebend of Norwich to the Mastership of Catherine Hall for ever. As Rector and Dean of Bocking he discharged his duties in a very exemplary manner. He was afterwards appointed Bishop of Chester, and translated to the Archbishopric of York. He died in 1724, at the age of 53, respected and beloved by persons of all parties. In addition to more sterling qualities, he is described as having been a man of peculiarly fine person, and mild, agreeable manners, to whom honour came, as it were, naturally, and on whom it sat admirably well.

Francis Gastrell, D.D., Oxford, was born in Northamptonshire, about 1662, and having been brought up at Westminster school, was elected on the foundation of Christchurch, Oxford. In 1694 he became preacher at Lincoln's Inn, and on being chosen to preach the Boyle's lecture in 1697, powerfully maintained the truths of Christianity against the cavils of the deists. In 1707 he preached an admirable sermon in the church of St. Sepulchre, on the occasion of the grand Anniversary Meeting of the Charity Schools, before the Society for Promoting Christian Knowledge; and in the same year, he put forth his excellent work, entitled "*The Christian Institutes*, or the sincere word of God digested under proper heads, and delivered in the words of Scripture." On his promotion to the Bishopric of Chester, he resigned the preachership of Lincoln's Inn. Bishop Gastrell died in 1725, and was buried in the Cathedral of Christchurch, Oxford.

Beilby Porteus, D.D., Cambridge, may be cited as another ornament of the see of Chester. He was one of nineteen children, and born at York, in 1731, of American parents, who had settled in this country. He was placed at a school at Ripon, and entered at Christ's College, Cambridge, at an early age. Having distinguished himself by his degree, and other academical honours, he became fellow of his college, and, for a short time, held the office of esquire Bedell. He was twenty-six years old on taking orders, and thirty-one when he was appointed domestic Chaplain to Archbishop Secker. The posts which he successively occupied in the church were well and ably filled by him. These were, the rectory of Lambeth, the bishopric of Chester, and, lastly, the bishopric of London. He was a persuasive and energetic preacher, his sermons being so attractive as to occasion great crowds of persons of all classes to attend the church where it was understood he would preach. He died in 1809, in the 79th year of his age, and was buried in a vault in the churchyard of Sundridge, Kent, where a neat monument has been erected to his memory.

We may justly insert in this distinguished list the name of Dr. C. J. Blomfield, Cambridge, who, after having been for some years the rector of an important parish in the metropolis, succeeded to the laborious charge of the diocese of Chester, and is now Bishop of London.

The see of Chester is at present filled by Dr. J. B. Sumner, also of Cambridge, a prelate, whose high character entitles him to a respectful mention in this short notice.

THE LAMPREY.

THE SEA-LAMPREY. (*Petromyzon marinus.*)

THE Lamprey tribe constitutes the last family of the fishes with a cartilagenous skeleton. There are four known British species; that figured above, which is found in salt-water, and three inhabitants of fresh water,—namely, the Lampern, *Petromyzon fluviatilis*; the Fringe-lipped Lampern, *Petromyzon planeri*; and the Sand-Pride or Mud-Lamprey, *Ammocœtes branchialis*. The Sea-Lamprey is found in all the seas of Europe, from the Mediterranean as far north as Scandinavia and Iceland; it is also met with in North America. In Spring and Summer this species frequents the mouths of most of our rivers, and ascends the stream for a considerable distance, for the purpose of depositing its spawn. Sir William Jardine says, speaking of the Scotch rivers, "They ascend our rivers to breed about the end of June, and remain until the beginning of August." They are not furnished with any elongation of the jaw, afforded to most of our fresh-water fish, with which the latter form the receiving furrows at this important season; but the want is supplied by their sucker-like mouth, by which they individually remove stones or other substances. Their power is immense; stones of a large size are removed by them, and a large furrow soon formed. This species remains in pairs, two in each spawning-place, and while there employed, retain themselves affixed to a large stone.

The right-hand figure below shows the flexible lip, concealing the mouth; the figure on the left hand represents the rounded mouth, the small and numerous tubercular teeth, and the central opening leading to the throat and stomach.

The Lampreys, like the sharks and rays, have no swimming-bladder, and being also without pectoral fins, are usually found near the bottom of the water. To save themselves from the constant muscular exertion which is necessary to prevent their being carried along by the current, they attach themselves by the mouth to stones or rocks, and from this circumstance they obtained the name of *Petromyzon*, Stone-sucker.

The food of the Lamprey consists generally of any soft animal matter; and in the sea it is known to attack fishes even of large size, by fastening upon them, and with its numerous small, rasp-like teeth, eating away the soft parts down to the very bone.

The Marine Lamprey usually measures from twenty to twenty-eight inches in length. In slowly-running water, the Lamprey swims with a lateral undulating motion of the body, assisted by its fins; where the current is rapid, it makes successive plunges forward, attaching itself quickly to any fixed substance that offers, to secure the advantage gained.

Pennant states that it has been an old custom, for the city of Gloucester annually to present the sovereign with a lamprey-pie, covered with a raised crust.

The Fresh-water Lampern is about half the size of the species just described, and is believed to remain in the rivers it frequents throughout the whole year. It is considered in best condition from October to March. Formerly it was in great request among the Dutch fishermen, as bait for turbot, cod, &c.; but the great demand so raised the price by making the fish scarce, that other substances have been resorted to. In the course of one season as many as 400,000 have been sold for bait, at 40*s.* per 1000. Formerly the Thames alone supplied from 1,000,000 to 12,000,000 Lamperns annually.

THE USEFUL ARTS. No. XXXV.

THE CARPENTER.

FOLLOWING the plan we have laid down, we shall first describe the principal materials made use of, by this most important of all mechanics. It is obvious that in every country the timber is employed that is either indigenous, and adapted to the work to be done, or which can be procured most readily from other countries. In Britain the first and most important of all trees is, of course, our own OAK, of which we have two species and several varieties, belonging to the genus *Quercus*. It is far less used in civil architecture than formerly, although there are certain purposes in building to which it is still applied: but owing to its value, and the demand for it for ships, and to the great labour required to work it, its place is now supplied by fir. The best oak is that which grows on cold, stiff, clayey soils, and is the slowest in arriving at maturity; and the colder the climate, or the higher above the level of the sea the tree grows, provided it be not stunted from severity of climate, the better the timber; hence Scottish and Welsh oak is more esteemed than that from the middle or southern counties of Britain. Our own island does not produce this timber in sufficient abundance to supply the demand, and large quantities of oak are imported from different countries, especially from Prussia and Canada. There are four kinds of oak used in the Royal Dock-yards, Welsh, Sussex, Adriatic, and Baltic, besides two others termed African oak, employed in different parts of the vessels, according to the qualities requisite for the particular purpose. Next to our own oak, that from the shores of the Baltic is by far the most esteemed.

In domestic architecture oak is only used in the largest and best buildings, occasionally for the principal beams; but its chief use is for door and window frames, cills, sleepers, king-posts of roofs, for trussing fir girders, for sashes, for gates of locks, sluices, posts, piles, &c. The timber called *African oak*, used in the navy, is wood of a different genus.

TEAK is the produce of a tree of the genus *Tectona*. Valuable as teak is found to be in ship-building, it has not yet been used in domestic building to any extent. From sixteen to eighteen thousand loads of teak are annually imported into Britain from India, principally for the Royal Dock-yards, this wood being used for certain beams and pillars in ships.

WAINSCOT is the wood of a species of oak, imported from Russia and Prussia in a particular form of log

FIR, or PINE, ranks next to oak for its valuable qualities, and if its universal application be taken into consideration, it might be thought even superior in importance. The finest fir is that from Norway, Sweden, Russia, and the Baltic generally, the vast mountainous tracks of which countries are covered with dense forests of various species of pine. The best of these is the *Pinus sylvestris*, called also in Britain the *Scotch Fir*, from its growing in great perfection in the northern portion of our island. The fir from the southern shores of the Baltic, the timber from which is known as Memel, Riga, or Dantzic fir, from the several

localities whence it is imported, is next in value to that from Norway. Large quantities of fir timber are also annually brought from Canada, but this timber is greatly inferior to the European.

Deal is the name given to the timber of the pine, when sawed into planks, in which form it is imported into this country from the north of Europe. Deal is the produce of the *Pinus abies*, *Pinus alba*, and *Pinus nigra*, and the best is that obtained from Christiana.

Fir timber is used for every part of houses, and extensively in ship-building, in the fittings-up, while it constitutes the only material for masts, for which purpose its lightness, and the great length and straightness of the trunk, peculiarly fit it.

Pine, or fir, is imported into this kingdom under the various names of timber, battens, deals, laths, masts, yards, and spars, according to the size or form into which the tree is sawed. It is called *timber* when the tree is only squared into a straight beam of the length of the trunk, and from not less than eight or nine inches square, up to sixteen or eighteen square; fifty cubic feet is a load of timber. Deals vary in length and thickness from eight to sixteen feet, eleven inches wide, and from one and a half to three and a half inches thick. Four hundred superficial feet of one and a half inch plank makes a load. *Battens* are small long pieces of fir about three inches wide and one inch thick. Masts, yards, and spars, are the trunks of small trees simply barked and topped.

Beech is partially employed in ship-building for the keel and timbers near it; but it is not at all employed in civil architecture. The principal use made of this wood is in the construction of machines, mill-work, lock-gates, &c., and for handles to tools; it is also a good wood for the turner, being of a close grain. It will not, however, bear alternations of moisture and dryness, and is liable to be attacked by worms, so that it is not extensively employed.

Chestnut belongs to the same order as the beech, but although a valuable wood, it is now little, if ever, used. Formerly it was extensively so, and the roofs of several ancient buildings are constructed of it. From some experiments, indeed, it seems to be as durable as oak itself.

Ash is the wood for the wheelwright and the maker of agricultural implements; it is one of the most valuable of all timber trees, combining great strength with elasticity and lightness; it, however, splits easily. Ash is not used either by the shipwright or the common carpenter.

Elm is a coarse-grained wood, but strong and durable; it does not work readily, and is therefore but little used. It is, however, employed for certain parts of ships, and for making casks, chests, coffins, posts for mill-work, and a few other purposes.

Next to oak and fir, the foreign wood Mahogany is by far the most valuable, and that most extensively used; it is the growth of the West Indies and South America, and the tree, the *Swietenia mahogani*, is, perhaps, the most majestic of all timber-trees for the enormous dimensions its trunk attains, its vast height and size, and its dark beautiful foliage. The mahogany of the island of Cuba, and that from the bay of Honduras, is first in estimation. There are two East Indian species, but they are not imported in any quantities into this country.

The best mahogany is that which grows in dry, cold, and exposed situations. Such wood is fine-grained, hard, and dark in colour, richly variegated, causing it from its beauty to rank among the most ornamental of fancy woods, while the light, coarse-grained wood, which grows in warm moist climates is sufficiently abundant to be used for ordinary purposes, and yet possesses admirable properties for all, where no great strength or tenacity is wanted.

Within the last twenty years the use of this wood has increased amazingly, and some ships have many of their upper timbers above the water-line constructed of Honduras mahogany. Its use in furniture and cabinet-making is well known, and, indeed, it may be said to be the principal wood used for this purpose, and to have entirely supplanted our own walnut, which was formerly in universal use for the same purposes.

The woods above enumerated are those most extensively or largely used by the carpenter; but there are several others employed for small articles, and for particular purposes, which deserve mentioning.

Box is the wood of the *Buxus sempervirens*, a hardy evergreen plant, indigenous in all the southern parts of Europe and Western Asia, and long domesticated in our shrubberies. Box is especially the wood for turning, it being closer-grained, denser, and tougher than perhaps all others, except iron-wood, Lignum Vitæ, and one or two rarer woods. Box is used for rules, scales, and for small cabinet works; but that which gives it particular importance is its universal use for wood engraving.

Lance is the name given to the wood of the *Guatteria virgata*, a tree indigenous to Jamaica, and one of the most important that are so, from the valuable qualities of its timber, lance-wood far exceeding our ash in lightness, strength, and elasticity; hence it is admirably calculated for shafts to carriages, handles to spears, and for all purposes where straight, light, flexible, and tough wood is required. It is neither so close-grained as box nor so hard, but it turns well, and does not split; in colour it is lighter than box.

Ebony is the name given to the wood of several different trees, which agree in being dark-coloured, dense, and durable; it is used for inlaying and for making rules or scales, as not being liable to warp. It is an excellent wood for turning, but except for these purposes, it is less in request now than formerly, when it was much used in cabinet-making.

Lignum Vitæ is the wood of the *Guaiacum officinale*, a large tree indigenous in the West Indies. This wood is the hardest and heaviest known, and can only be worked in the lathe. It is much used for making the *sheaves*, or pullies of blocks used in shipping, and for friction rollers, &c.

There are a variety of foreign woods which, from their beautiful grain and varied tints, are used in cabinet-making. But as these woods are too valuable to be used solid, they are sawed into thin leaves, called *veneers*, which are glued down on a backing of ordinary mahogany. The principal of these fancy woods are—

Rose-wood, which is produced by a tree, a native of Brazil. This wood is much used for furniture, both as a veneer, and solid for legs of tables, chairs, &c.

King-wood is also the produce of Brazil; it is a dark chocolate wood, veined with fine black veins.

Beef-wood comes from New Holland, is of a pale red even tint, and intensely hard and heavy. It is used for inlaying and bordering.

Tulip-wood is a wood of a clouded red and yellow colour, and very hard, and used for bordering to larger woods. The tree is unknown to our botanists.

Zebra-wood is a large-sized tree, and abundant enough to be used as a veneer in large furniture, like rose-wood; it is more curious than elegant.

Satin-wood is well known for its glossy yellowish tint, from which it derives its name; there are two varieties.

Maple, from our own indigenous tree, is a very elegant wood of a light colour, or else, near the root, variegated with knots and twisted grain. It is much used in fancy-work.

Of the great number to whom it has been my painful professional duty to have administered in the last hour of their lives, I have sometimes felt surprised that so few have appeared reluctant to go to the undiscovered country "from whose bourne no traveller returns!" Many, we may easily suppose, have manifested this willingness to die from an impatience of suffering, or from that passive indifference which is sometimes the result of debility and bodily exhaustion. But I have seen those who have arrived at a fearless contemplation of the future, from faith in the doctrine which our religion teaches. Such men were not only calm and supported, but cheerful, in the hour of death; and I never quitted such a sick chamber without a hope that my last end might be like theirs.—Sir Henry Halford.

We know, and what is better we feel, inwardly, that religion is the basis of civil society, and the source of all good and of all comfort. We know, and it is our pride to know, that man is by his constitution a religious animal; that atheism is against not only our reason, but our instincts, and that it cannot prevail long. But if in the moment of rest, and in a drunken delirium from the hot spirit drawn out of the alembick of hell, (which, in France, is now so furiously boiling,) we should uncover our nakedness, by throwing off that Christian religion, which has hitherto been our boast and comfort, and one great source of civilization among us, and among many other nations, we are apprehensive (being well aware that the mind will not endure a veil) that some uncouth, pernicious, and degrading superstition might take place of it.—Burke.

ON EMPLOYMENTS WHICH INJURE THE EYE-SIGHT.

No. IV.

LINEN-INSPECTORS — BANK-NOTE INSPECTORS — BURNISHERS — PAINTERS — MINERS AND COLLIERS—EFFECT OF HEAT UPON THE EYE-SIGHT —CASTING OF STEEL—BURNING OF PAINTED GLASS.

We now proceed to notice a few employments wherein too much or too little light proves injurious to the eye.

It is of course known that the value of cloth depends upon the fineness of its material, and the degree of closeness with which it is put together. In the process of weaving, the threads, whether of silk, cotton, or wool, &c., cross each other at right angles, and constitute what is technically termed the warp and the woof. The value of the cloth therefore is tested by the number of threads contained within a given space—the larger the number, the more valuable becomes the article. There is a class of persons called *linen-inspectors*, whose business it is to test the value of cloths in this way, and such persons suffer loss of visual power, in consequence of the constant application of the eye to this kind of work. Those engaged in examining white linen cloths suffer more than when dark colours are the subject of investigation; and among the coloured cloths the scarlet, with which our army is clothed, produces the worst effects. The reader is probably aware that white cloth reflects most light; and that of all the colours of the spectrum red is the least refrangible, and although yellow and orange colours afford most light, yet red affords most heat, and is, from causes not well understood, productive of irritability to the eyes of most animals. Scarlet is a compound colour, containing a large proportion of red, combined with yellow*. Manufacturers of bright colours also suffer injury to the eyes.

It is said also that at the Bank of England a new issue of bank-notes is productive of ocular disease among the clerks, whose employment it is to examine, sign, and counter-sign an immense number of these documents per day. The money counters also, in the same establishment, are said to be peculiarly liable to amaurotic affections, especially at every new issue of coinage, when the pieces are highly polished, and consequently reflect much light.

Burnishers form another class of persons peculiarly liable to this disease, particularly such as are engaged in producing upon metallic surfaces a high degree of polish. One of the results of the simple, and otherwise admirable, principle of the division of labour, is certainly attended in some cases with its evils, by splitting up one branch of business into a large number of collateral shoots, it reduces man to a machine, and often deprives him of the power of exercising his invention; and, as in this case, proves positively hurtful. Hence we have an additional proof of the value of automatic machinery in effecting those processes by which man is injured, and his powers impaired.

In the instances we have given, the hand and the eye are chiefly employed, while the mind rests; but Nature is not partial in her rewards or her punishments. A high degree of mental cultivation does not exempt a man from the penalties due to transgression: the disciple of Claude, or of Galileo—of Hunter, or of Watt,—is exposed (as we shall see) in the exercise of his high calling to the inconveniences of the humblest artisan. Nothing, in fact, proves so well to us the dependent and even coequal condition of man in the scheme of creation as the universality and individuality of the application of the natural laws to which we are all alike subject. We have heard the case of an eminent landscape-painter, who in the ardent pursuit of his profession became troubled with confusion and dimness of vision. He abandoned his practice for a time, and gave rest to his eyes, the inflammation of which yielded to proper medical treatment. Upon attempting to resume his occupations he was much alarmed to find that he no longer possessed the power of discriminating shades of colour from each other: he had, in fact, apparently lost the faculty necessary to his profession. He had again recourse to medical treatment, and after a time was restored to perfect sight.

The above instances occur, as it will be seen, in employments where too much light is admitted to the eye, whereby it becomes irritated and fatigued. On the other hand its occupation in a dim uncertain light is productive of results equally disastrous. In this case it is strained as it were beyond its powers, in endeavouring to exercise its function in the absence of the only necessary means, namely, a moderate and steady supply of light. Such persons are the numerous class of miners and colliers, whose employment is underground, amid the fitful gleams of a few lamps or candles, which the very position of the workmen prevent from being other than weak and almost inadequate sources of illumination; while in the collieries the lamps are necessarily surrounded with wire-gauze to prevent the firing of the gas which often issues from the apertures (blowers) laid open by the workman's pick, and thus the already feeble illumination is enfeebled. The exposure then of the eye to this bad light for several hours, and the transition into the light of day above when the miners' daily toil is done, is in many cases productive of the disease we have described. In the stupendous mines of Southern America immense numbers of the natives were, while under Spanish dominion, kept entirely in the mines, together with their wives and children; and thus, as an ingenious Frenchman observes, those very persons whose ancestors worshipped the sun are born, live, and die, without ever having been blessed with a sight of his rays.

> Ah! what avail their fatal treasures, hid
> Deep in the bowels of the pitying earth,
> Golconda's gems, and sad Potosi's mines;
> Where dwelt the gentlest Children of the Sun?
>
> THOMSON.

The united effect of the dim light in which colliers are constrained to perform their daily labour, and of the contaminated atmosphere which they breathe, is thus alluded to by Mr. Thackrah, in his work on the *Effects of Trades, Professions, &c. on the Health.*

The eyes of colliers are small, affected with chronic inflammation, and intolerant of full light. Boys enter the pit at the age of six or seven, and are employed in opening the trap-doors, driving the horses, propelling the trucks, &c.; and finally, when of sufficient age, they become colliers. Sickness and vomiting sometimes affect persons at their commencing the employ, and many after a few years' trial are obliged, by the injury which their health has sustained, and especially by the weakness of the eyes, to leave the mine.

(3.) As the exposure of the eye to too much light is injurious, it almost follows that too much heat is equally so. It is painful to reflect that many of our

* The bull, the turkey, and other animals, manifest great impatience and anger at the sight of a red colour. This is probably due to an irritation of the optic nerve, induced by this particular colour: this is, however, only a surmise of the writer. A young man was recently killed by holding out his tongue to an adder which he had caught, and doubting whether it was a snake or an adder, put out his tongue to test the fact. The animal, irritated by the red appearance of the tongue, bit it; and the bite was fatal, for the young man died some hours afterwards.

luxuries are purchased at the expense of much human suffering. True it is that by habit men may become inured to extraordinary and unnatural circumstances, which do not indeed exert their fatal influence at once upon them, but which would sink an unaccustomed hand. Undoubtedly, by early use and training, the body may successfully withstand high degrees of heat, as the experiments of Sir C. Blagden, Chantrey, and others, and the every-day experience of our gas-factories, glass-houses, &c., prove; and it is possible that in all the successful cases the individuals are fitted peculiarly by nature, or the habit of early training, for the exercise of these pursuits; still, however, it is to be lamented that there are many cases of workmen whose powers fail them for their own peculiar callings. How far habits of intemperance influence their fate, it is not within our province to discuss, although we fear that much is to be attributed to this energetic and too common cause.

On a visit a few years ago to an immense foundry, about noon on a hot summer's day, we were much struck by the situation chosen by several of the men for the consumption of their dinner. They were seated on the copings of several enormous forge-fires, the heat of which was so great as to prevent our approach within several yards, and yet these men appeared to suffer no inconvenience whatever, for as it would seem they were in a temperature natural to them, which, however, was so great that the broad sunshine, into which we soon went, appeared cool in comparison.

But the above instance of the power of the human frame to bear intense degrees of heat, sinks into insignificance when compared with many cases of constant occurrence in the arts and manufactures. We must be content at present with the selection of one only. The reader may be aware that steel is fusible, or capable of being melted, and when in the fluid state of being cast in moulds, by which process the natural qualities of the metal, its hardness and elasticity, and the permanence of the edge in cutting-tools, are very much improved. The steel which is to be cast is previously broken into small pieces, put into a clay crucible capable of holding between thirty and forty pounds of the metal, and so placed in a wind-furnace, where it is brought to a white heat, which is sustained for about four hours, in which time the liquefaction of the mass is complete: the furnace-cover is then removed, and other preparations are made for pouring the metal into cast-iron moulds. "This is a process which places the melter in a situation little, if at all, enviable, as compared with the inside of M. Chabert's celebrated oven: indeed the eyes and the hands that are daily conversant with molten steel would hardly shrink at the mention of a temperature sufficient to broil a beef-steak! Previously to drawing the crucible, the artist, whose body, arms, and legs, are defended by sacking-wrappers, goes to a water-trough, and with a besom thoroughly moistens his outer covering, that his clothes may not get a-flame, while he is bending over the mouth of the 'burning fiery furnace.' Thus prepared, with a pair of strong tongs he withdraws the pot from the fire, takes the lid off, and pours the metal into the mould. The ingot thus formed is either a bar about two inches square for tilting, or a plate six inches broad, twelve to eighteen inches long, and an inch thick, for rolling, as the same may be wanted to be wrought into its ultimate form by the hammer or the shears. It may perhaps be thought that this fluxing and pouring of the metal requires no very great skill in the management. It is, however, a fact, that so much depends upon the most exact attention to a number of minute particulars, only to be attained by a rare union of judgment and experience, that a person who thoroughly understands the business is invaluable as a workman, and his earnings are accordingly great. Honourable instances are not wanting of these melters having become persons of property, not to say that they have set up their carriages! The importance of their avocation is indeed much greater than may generally be imagined, even when the best irons are used. Not only does the perfection of innumerable exquisite cutting instruments depend almost entirely upon the quality of the metal, but much of the glory of the fine arts. The steel plates, which by a wonderful triumph of skill the engraver has appropriated, the burine of Heath and the chisel of Chantrey, respectively owe their excellence to a judicious management of the crucible by the Sheffield cast-steel melter."—*Manufactures in Metal.*

A melancholy case has occured recently to a friend of the writer, an ingenious painter on glass and glass-stainer. The stained glass which enters into the composition of church and cathedral windows, often containing pictures and figures of high excellence, is produced in the first instance, by applying a coloured composition to white glass, or painting on glass, as on canvass, with a coloured compost which will resist heat: the glass being thus prepared by the artist, its durability through long ages is ensured by a process termed *firing*, which consists in placing the glass in a close iron box or oven, called a *muffle*, and which is provided with horizontal iron shelves, placed at regular distances, and covered with well-burnt powdered lime, to prevent the contact of the glass and the hot metal. On these shelves the glass plates are deposited, the coloured surfaces of course upwards. The muffles are placed in a furnace, and each muffle is furnished with a tube, which passes out through the furnace-wall, the use of which tube is to enable the operator to examine the state of the glass during the process of firing. A fire is now kindled and heat continued until, on inspection, the glass contained in the muffle is found to have acquired a heat just sufficient to fuse it: by this means the colours are absorbed into and become part of the glass. The watchful eye of experience alone detects the exact moment when the white heat, to which the furnace has been brought, must be reduced: the whole contents of the furnace are left to cool gradually for about twelve hours, at the end of which time the glass is said to be annealed, or to have lost that brittleness which it would have had if it had been removed from the furnace immediately.

The gentleman referred to had been engaged for several years in managing the above process, when a few months back, after looking for a longer time than usual through one of the tubes into the furnace, while the contents of the latter were at a white heat, he entirely, and as it appeared to him suddenly, lost the sight of the eye he was employing. The retina was in fact struck with palsy, from which we regret to add he has not since recovered. And yet how wonderful is the fact, that although the eye in this case is totally insensible to luminous impressions, and at present is of no assistance to its owner, yet the pupil still retains to a certain extent its contractile and expansive power when light is more or less admitted to the visionless orb. This fact tends to show how independent the function of the iris is of the will.

In this class are included stokers in iron-furnaces and glass-houses, and the denizens of the smithy generally, together with tavern cooks, &c.

THE OVAL, THE ELEMENTARY FORM OF BEAUTY.

The indescribable beauty of outline which pervades many of the works of antiquity, has been the cause of many attempts to discover if there was any fundamental principle to which this peculiar beauty was to be ascribed. All parties seem to have agreed that it depends on various modifications of a curved line. Mr. Reinagle, the Royal Academician, endeavoured to show, in a lecture delivered at the Royal Institution in 1827, that ovals of various sizes would mechanically produce various elegant and symmetrical outlines. His endeavour was to prove, "that a line formed by an elliptic curve was beautiful even in an abstract point of view, free from all association." To illustrate his views he employed various diagrams, such as are seen in the following figures.

No. 1 and 2 are a series of straight parallel lines, arranged horizontally and vertically; these were shown to produce no principle of beauty. In No. 3, a series of straight lines are drawn so as to radiate from a centre producing the simplest beautiful arrangement of lines. In Nos. 4 and 5, he endeavoured to prove that a series of straight lines, radiating from centres, as fig. 4, were improved in beauty by the addition of curves, as in No. 5. Nos. 6 and 7 illustrate the improvement produced by substituting curves in the rays, as in No. 6, and a still further improvement by additional curves, as in No. 7. Pursuing the same idea, it was shown that if the rays proceeded from a curved instead of a straight line, as in Nos. 8, 9, the beauty of the arrangement was increased, No. 9 being the most elegant.

If an oval disk, fig. 2, is prepared, the beauty of the

Fig. 2.

Fig. 3.

combination of elliptic curves may be illustrated in various ways, as in fig. 3, where the curves are placed at random; fig. 4, in which they radiate from a centre, forming a most beautiful figure, capable of becoming the ground-work of an elegant design in foliage or ornament. If the oval disk is applied, as in fig. 5, and the whole of its outline repeatedly drawn, a

Fig. 4.

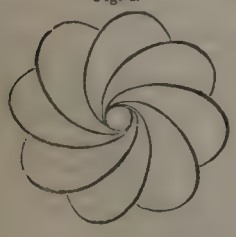
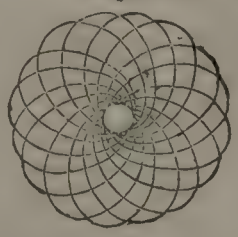


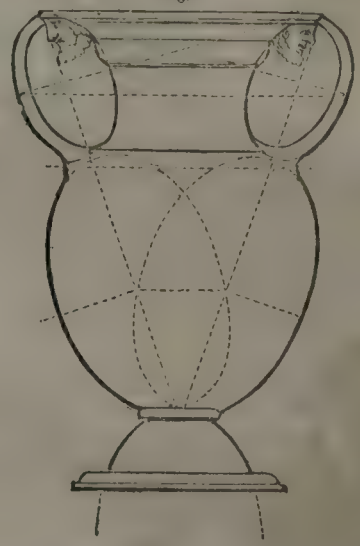
Fig. 5.



much more elegant and complicated figure is produced, something like what school boys draw with a pair of compasses, and known by the name of a Turk's cap.

The following method of further elucidating the properties of the oval, will form an amusing problem for the young draughtsman. To make these drawings, two ovals of different sizes, cut in card-board, are necessary. Fig. 6 is a Greek vase, with handles,

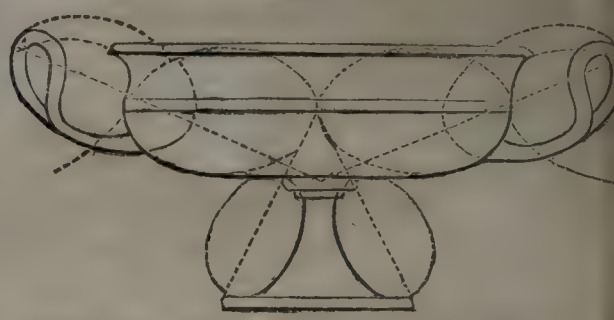
Fig. 6.



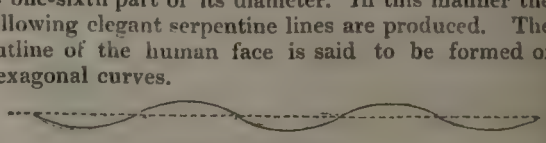
formed in the following proportions of seven parts; the body has four parts, the foot one, and the neck two. The greatest width of the body is equal to the longest diameter of the larger oval.

Fig. 7 is another illustration of the use of the oval in forming a flattened vessel called a *patera*.

Fig. 7.



We have thus seen in what manner many elegant figures can be produced by the symmetrical arrangement of elliptic curves; some, however, contend that the line of beauty is formed of what is called an hexagonal curve, that is, an arc of a circle equal in length to one-sixth part of its diameter. In this manner the following elegant serpentine lines are produced. The outline of the human face is said to be formed of hexagonal curves.



Nature has perfections in order to show that she is the image of God, and defects in order to show that she is only his image.—Pascal.

Abstruse speculations, whatever they may have at the bottom of solidity and truth, suit not the capacities of the many, and influence the hearts of none.—Bishop Horsley.

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KILLARNEY. No. VIII.

VIEW ON THE UPPER LAKE, FROM RONAYN'S ISLAND.

THE Upper Lake at Killarney, lying to the westward of the Lower Lakes, is embosomed above them in the mass of mountains which, for some distance, covers the country beyond them in that direction. The lofty wall thus separating it from them, is perforated only at one point, where a deep defile affords a narrow channel for the waters descending from the Upper Lake to the Lower Lakes. For a long time the only convenient mode of passing from the Lower Lakes to the Upper Lake was by ascending this connecting stream in a boat; but within the last few years a new road has been constructed, running up along the margin of the channel. This road does not end at the top of the channel; it passes by the Upper Lake, (at one part through a tunnel,) and continuing its course to the westward between the mountains, at length reaches the town of Kenmare, upon that inlet of the Atlantic which is called Kenmare River.

The channel of communication itself is about three miles in length; it winds considerably, and varies very much in its breadth. The narrowest part is at the very top, where it is contracted into a little passage, scarcely more than thirty feet broad. This pass bears the appellation of Coleman's Leap; and it is said to be so called after a legendary hero of that name, who, in the eagerness of the chase, or in the pursuit of an enemy, leaped across the chasm here, and left the impression of his foot or feet (for the accounts differ,) in the solid rock. There is a mark still shown as his veritable foot-print, and the wonderful phenomenon is "minutely described, and studiously exaggerated, by the credulous guides."

To a traveller ascending this connecting river in his passage from the Lower Lakes to the Upper Lake, this extraordinary contraction of the channel at Coleman's Leap has a very remarkable appearance.

The devious course of the river above the Eagles' Nest*, and the numerous impediments which commonly arise from rocks, shoals, and the rapidity of the current, are productive of repeated disappointment, and excite no small degree of impatience in those who anticipate the view of the romantic confines of the Upper Lake. The long-wished for scene is expected to open at every turn; but one short reach of the river succeeds to another, terminated by huge rocks, beyond which nothing is visible but distant mountains. At length the boat arrives in a little basin, bounded for the most part by steep rocks, to which several different outlets appear. The stranger naturally concludes that one to be the proper channel which is the widest, and whose direction accords best with the course of the river; it is not without

* Of this remarkable rock we have already given a description. See Killarney, No. I., Vol. XI., p. 57.

surprise therefore that he beholds the oars, after a few strong and rapid stokes, drawn in, and the boat suddenly put about and directed through a narrow pass between the rocks, barely sufficient for its admission. This is the entrance to the Upper Lake, and soon after passing it, the most distant shores are revealed to view, with the immense mountains which rise beyond them.

On passing Coleman's Leap the traveller enters at once upon the Upper Lake. He finds it to be entirely encompassed by mountains; and if, after proceeding a short distance, he cast his eyes back, he is unable to distinguish the narrow opening by which he entered, so completely is it lost in the confusion of hill, bay, and promontory. "In this retreat from the busy scenes of life, the beautiful and the sublime are exquisitely united."

On the south of the lake stands Cromiglaun or the Drooping Mountain, which rises from the very water. Adjoining this, on the west, is Derricunnihy, after which comes Derry-Dinma, separated from it by the little river Kavoge. The Coombui Mountains are seen in the distance towards the south-west; and further to the west is Barnasna. In the west are also seen Baum, with its conical summit, and the Macgillicuddy's Reeks, with their lofty, shattered, and shelving tops. The nearest of the Reeks to the lake is that called Ghirmeen, at the foot of which is the entrance to the sequestered defile of Comme Duff, or the Black Valley. On the north and east are Ghirmeen and the Purple Mountain at a distance, and the Long Range (as the mountains on the north of the channel between the Upper and Lower Lakes are called,) backed by Tomies and Glena.

From its situation in the midst of a stupendous amphitheatre of mountains, the Upper Lake displays the most wild and romantic scenery. Its length is nearly the same as that of Turk, its breadth somewhat inferior. The mountains which bound it on every side, are a continuation of those forming the defile through which it is approached, and their characteristic features are similar, but they are loftier, and all their parts are on a grander scale; the glens are deeper, the woods more extensive and of older growth, the rivers larger, and the falls more lofty and precipitous. The highest mountains are those at the upper end of the lake, which are likewise the most varied in their outline; among them rise Macgillicuddy's Reeks, "pre-eminent in grandeur." Of these Reeks, which are the highest mountains in Ireland, we have already given an account*. They are visible from the Lower Lake, but their appearance, from the Upper Lake, is so different, that they would scarcely be recognised for the same.

On entering the Upper Lake (says Mr. Weld,) the attention is at first wholly engaged by the vastness of the mountains, and next by the extreme wildness and ruggedness of the scene. The numerous islands, as well as the shores, present on every side immense rocks; some bleak and terrific, others of a less savage aspect, teeming with vegetable life.

The islands in the Upper Lake are very numerous; the rocks along their shores generally consist of a green stone, which, close to the edge, assumes a dark hue, agreeing so nearly with the reflections of overshadowing trees in calm weather, that the line of separation cannot be traced without difficulty.

And here (says Mr. Wright), as in all her works, Nature has proved herself the most accomplished artist, in adapting the light and airy tints of the limestone-rock to the gay and luxuriant shores of Glena and Mucruss, and the more dingy shadows to the bold, terrific, and savage features of the Upper Lake. This exposure of the rocky bases of the islands and stony strands, which occur in the lakes of Kerry, forms a distinguishing character between them and the English lakes, where the green sod always confines the apparently overflowing waters, producing the idea of eternal plenitude.

The most striking of the islands upon entering the lake is, Oak Isle, or Rossburkree, which in the Winter season, is separated into several parts, so as to form a cluster of islets. It rises from a rocky base, and is crowned with wood; from its shores is obtained a splendid and majestic view of the lofty mountains, which form so characteristic a feature of Killarney, grouped in the most varied manner.

The shores of the Upper Lake are extremely intricate, being indented by numerous wooded and rocky promontories, by bays, inlets, and long creeks, which wind towards the base of the mountains, as if purposely to receive the streams which rush through the glens, and conduct their waters in silence and tranquillity to the lake. The largest of these inlets is that bearing the name of Newfoundland, which lies at the eastern extremity of the lake, and is nearly three quarters of a mile long. The entrance into this inlet lies through a narrow pass, defended by two vast perpendicular rocks, in passing which an extensive basin suddenly opens to view, bearing the appearance of a fourth lake. On the right of this inlet rises a steep overshadowing cliff, clothed with straggling trees: on the opposite side it is bounded by masses of bleak rocks, while the distant view in the middle of the picture is occupied by a wood of oaks, from out of which issues the river Esknamucky, which may be ascended for some way in a boat. Mr. Wright says that a walk along the banks of this stream will surprise and delight the tourist. An irregular path winds along the banks between trees whose thick foliage confines the view until at the end of about half a mile, a space suddenly opens, discovering some cottages, surrounded by a few small enclosures. The sound of falling water here strikes the ear; and on turning the eye towards the Turk mountain, which the visiter has thus insensibly approached, a beautiful cascade is seen over the trees at the head of a deep glen.

It is scarcely in the power of imagination to conceive a more romantic retreat. No vestige of human industry appears beyond the precincts of this little hamlet: woods and mountains surround it; and the inhabitants seem totally cut off from the society of their fellow creatures. Nor is the retreat less remote in reality from the busy scenes of life than it appears to be: the plough has never left the traces of its furrows on the vale; the soil is turned with the spade; and the produce, if more than sufficient for the maintenance of the humble cultivators, is conveyed away on horses, by a craggy path which winds along the borders of the stream.

Advancing up the lake towards its western end the visiter passes Arbutus Island, which lies on the northern shore, about half a mile to the west of the entrance into the lake at Coleman's Eye. It is so called on account of the profusion of the arbutus plant which it displays, and which indeed covers the rocky sides of its pyramidal form. Of these strawberry trees, which are to be found in abundance on every part of the shores of Killarney, but in especial luxuriance in the islands of the Upper Lake, which are celebrated for possessing the finest specimens of the plant in the British Islands,—an anonymous writer thus speaks:—

In the latter end of October, when I first visited Killarney, they were in high beauty, many of their bells and blossoms still remaining, the fruit on some just forming, and on others nearly ripe. The same bough often exhibited all these varieties. The ordinary height of the tree is ten or twelve feet; but I have seen some, of a happier growth, which rose to eighteen or twenty. The blossom is shaped like a goblet, and the fruit nearly spherical; it is at first

* See *Saturday Magazine*, Vol. XII., p. 137.

of a pale yellow, which deepens as it advances to ripeness, and gradually gives place to a rich scarlet. It equals the largest garden strawberry in size, but must be eaten with more caution, for those who are unaccustomed to it, and indulge too freely, are seized with an oppression little less than lethargic. This I take upon the credit of the country-people, who use it themselves without reserve, generally accompanying it with a hearty draught of water, to qualify its juices. The elder Pliny calls this fruit *unido*, because no more than one berry can be eaten at a time with safety; but Virgil makes it the common food of the first inhabitants of the earth; following Lucretius, who ranks it with the acorn itself, and tells us that in the earlier ages it grew to an extrordinary size, and was found in great abundance. The arbutus was no less esteemed among the ancients for its pleasant shade than for its fruit, as may be discovered from the poets, and particularly from Horace, the admirer and best judge of whatever is elegant in retirement.

> Thy isle, gay green, of never-fading dye,
> Spreads Nature's comeliest wardrobe to the eye
> And when the honours of the groves are shed,
> Midst the pale ruin lifts its blooming head:
> Now o'er the glassy and pellucid stream,
> Throws the mild lustre of the emerald beam;
> One everlasting smile of joy it wears,
> And winter's sickly, drear dominion, cheers.

A little beyond Arbutus Island, on the opposite side of the lake, the visiter reaches Coffin Point; and as soon as he has doubled it, he discovers that it is the end of a very long narrow promontory, and stands at the mouth of a large bay or inlet, which runs inland for a considerable distance, and receives at its termination or head, the little river of Derricunnihy Mountain, or the river Kavoge as it is called. The cascades on this river far surpass, both in beauty and volume, all others at Killarney, being, in general, the best supplied with water. They lie concealed from the lake, being situated in the depths of a thick wood; and the numerous rocks and thick tangled underwood which intervene, render the approach to them a task of some difficulty.

At the western end of the lake lies the little cluster or archipelago of the Seven Islands, which are beautiful in themselves, and so grouped as to form a delightful assemblage. They are all lofty and rise very boldly from the water upon rocky bases, whose bold broken crags in many places overhang the lake, which "seem to forbid the approach of human footsteps, and consecrate them to their native ospreys and eagles."

The largest of these islands is called Ronan's or Ronayn's Island; and a visit to it forms an essential part of the regular tour of the lakes. It is richly wooded with oak, arbutus, and other trees, and is accessible at only one spot, namely, close to the cottage. Hence a path winding round the rocks leads to an eminence or sort of natural terrace on the summit of an island, about thirty feet above the surface of the water.

No power of language, (says Mr. Weld,) is adequate to convey an idea of the wildness and variety of the view which opens from this spot. The lake is seen in all its intricate windings studded with islands, and bounded by immense mountains—

> With woods o'erhung and shagg'd with mossy rock,
> Whence on each hand the gushing waters play,
> And down the rough cascades white dashing fall,
> Or gleam in lengthened vistas through the trees.

Not a single habitation, not a trace of man's labour can be discovered in any part of this vast amphitheatre. . . . . It is scarcely possible to enter the confines of this sequestered and enchanting region, without feeling the influence of a spell which abstracts the mind from the noise and folly of the world, and banishes for the moment the desire of returning to the gay and busy scenes of human life.

It is from Ronayn's Island that the view represented in our engraving is taken: the large mountain in the background is that which bears the name of Derricunnihy. The surface of the island is covered with successive layers of the decayed vegetable matter, which is furnished by the trees, and the appearance of which is deserving of notice.

In traversing this island, (says an anonymous writer,) I observed it was carpeted over with a thick covering of decayed leaves and boughs. I could easily discover the strata of the several past years by the different degrees of putrefaction; till near the bottom, where the dissolution was more complete, they were cemented into one uniform mass condensed by the pressure above, and so swoln by the rains and moisture as not to be at all distinguishable. As the decay was more perfect, the colours declined more perceptibly from the original lighter tints, ending in the bottom in as perfect a black as I ever saw in any of our bogs. The similitude of the contexture as well as the colour, convinced me that the black bogs with which Ireland abounds, have been formed by the same process: a process which is probably forwarded by the continual moisture and rains in a climate neither burnt up by scorching heats, nor congealed by the rigours of cold.

The similarity here spoken of between the mass of decayed vegetable upon this island and the peat of the bogs does exist. The average depth of the peat in the bogs being twenty-five feet, its surface is covered with moss of various species, and to the depth of ten feet it is composed of a mass of the fibres of similar vegetables in different stages of decomposition, proportioned to their depth from the surface; below this to the depth perhaps of ten feet more, generally lies a light blackish-brown turf, in which the fibres of moss are still visible though not perfect. At a greater depth the fibres of vegetable matter cease to be visible, the colour of the turf becoming blacker, and the substance much more compact in proportion as the depth increases; near the bottom it forms a black, which, when dry, has a strong resemblance to pitch or bituminous coal. The old opinion, however, at one time very generally adopted, that the bogs have originated from the decay of large forests is not tenable at the present day; more recent investigations having led to the discovery of facts incompatible with that theory of their formation. The trees which are found in the bogs, standing as they grew, have generally six or seven feet of compact peat under their roots, clearly proving the formation of the peat to have been previous to the growth of the trees.

To enter at any length into a description of the various bays and inlets, glens and cascades on this romantic lake, would be useless and fatiguing to the reader. The visiter who has sufficient time at his disposal will do well to explore it at his ease; he will find an ample reward for his trouble in the extraordinary variety of scenes which its irregular and almost fantastic arrangement enables it to display.

The new road running along the margin of the channel between the Upper Lake and the Lower Lakes, should not pass unvisited; to those who have but a little time at their disposal, it affords a good survey of this remarkable passage which is spoken of as being "quite unique in mountain scenery." The rocks which enclose the channel have a very romantic appearance, every cleft being choked with arbutus, holly, and other evergreens; and "the scenery along the whole of this beautiful piece of road," to use the words of Mr. Barrow, "is quite enchanting."

The new road to Kenmare, (says another recent writer,) has converted the aquatic system of viewing the lakes into a more secure, and for that reason, perhaps, a more agreeable mode, and has at the same time unfolded a new series of landscapes into which the lakes themselves enter as minor component parts, an advantage but partially enjoyed in sketching either from the water or its banks. From the curious tunnel through which Mr. Griffiths' romantic road is conveyed, the Upper Lake is seen expanding and spreading away amidst little bays and indentations, until it appears to lave the foot of the majestic Carran Tual.

ILLUSTRATIONS OF THE BIBLE FROM THE MONUMENTS OF ANTIQUITY.

No. XIII.

The Overthrow of Pharaoh's Host in the Red Sea.

Pharaoh had no sooner given the children of Israel liberty to depart than he became sorry for his concessions, and resolved to pursue them. From what we have said before, it is evident that the Hebrews were valuable subjects; they occupied rich pastures which the native Egyptians would have neglected, partly from their dislike of a pastoral life, and partly from dread of the Arab tribes; they had been profitable slaves in executing the public works, which the usurping invaders had deemed necessary for their security; and, finally, their example was likely to influence other races in Upper and Middle Egypt, to withdraw themselves from their allegiance to the foreign intruders. The Scripture narrative very clearly intimates the motives which actuated the wicked king.

And it was told the king of Egypt that the people fled: and the heart of Pharaoh and of his servants was turned against the people, and they said, Why have we done this, that we have let Israel go from serving us? (Exod. xiv. 5.)

It was no point of duty, no feeling of pride, and still less was it any sense of wrong, which induced the monarch to violate the compact he had so recently made with Moses. Avarice, not ambition, hurried him forward; he was enraged at the thought of losing such profitable slaves. His preparations for the pursuit must next engage our attention.

CHARIOT, CHARIOTEER, AND WARRIOR.

And he made ready his chariot, and took his people with him: And he took six hundred chosen chariots, and all the chariots of Egypt, and captains over every one of them. And the Lord hardened the heart of Pharaoh king of Egypt, and he pursued after the children of Israel: and the children of Israel went out with an high hand. But the Egyptians pursued after them, all the horses and chariots of Pharaoh, and his horsemen, and his army, and overtook them encamping by the sea, beside Pi-hahiroth, before Baal-zephon. (Exod. xiv. 6—9.)

It is first mentioned, that "he made ready his chariot;" on the monuments kings and noble warriors appear always mounted in chariots, when they are going out to war or to a distant chase. The chariot appears generally to have been framed of wood, but in one or two instances it would seem as if at least part of the frame was made of brass. It was mounted on two wheels, which were sometimes of wood and sometimes of metal. In the age of Solomon cast wheels appear to have been principally used, for in the description of the great brazen laver, we read,

Under the borders were four wheels; and the axletrees of the wheels were joined to the base: and the height of a wheel was a cubit and half a cubit. And the work of the wheels was like the work of a chariot-wheel: their axletrees, and their naves, and their felloes and their spokes, were all molten. (I. Kings, vii. 32, 33.)

The engraving which we have copied, represents a Jewish, not an Egyptian chariot, but the description of one is, in a great degree, applicable to the other; and we shall, as we proceed, point out the most remarkable points in which they differed. The chariots were intended to carry two warriors, one of whom principally attended to the management of the horses, while the other wielded the weapons of war. But in the Egyptian representations, we frequently find the king or warrior alone in the chariot, and in one example we see the charioteer with the reins fastened round his body, while his hands are engaged in wielding his bow and arrows. No mention is made of any similar practice in Holy Writ; whenever there is mention made of a royal chariot, the driver or charioteer is particularly noticed. Thus, in the account of Ahab's death at the battle of Ramoth Gilead:

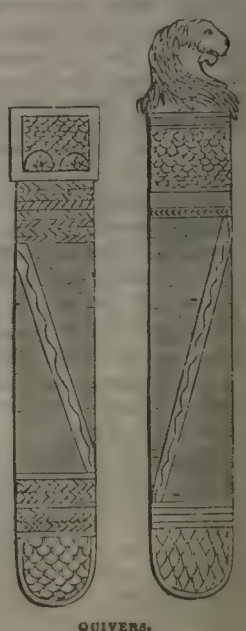
And a certain man drew a bow at a venture, and smote the king of Israel between the joints of the harness: wherefore he said unto the driver of his chariot, Turn thine hand, and carry me out of the host; for I am wounded. And the battle increased that day: and the king was stayed up in his chariot against the Syrians, and died at even: and the blood ran out of the wound into the midst of the chariot. (I. Kings, xxii. 34, 35.)

The second verse which we have quoted, leads us to remark a peculiarity of the ancient chariots, which we shall again have occasion to notice; they were open at the back, and unprovided with a seat; hence when Ahab was mortally wounded, his servants were obliged "to stay him up" in his chariot, otherwise he must have fallen out in the hurry of the retreat. This circumstance also enables us to appreciate the fulfilment of Elijah's remarkable denunciation against Ahab:

Thus saith the Lord, Hast thou killed, and also taken possession? And thou shalt speak unto him, saying, Thus saith the Lord, In the place where dogs licked the blood of Naboth shall dogs lick thy blood, even thine (I. Kings, xxi. 19.)

The blood welling from the wound coagulated on the floor of the chariot, and when the servants washed it in the pool of Samaria, the dogs licked the drops as they trickled on the ground.

Every chariot was drawn by two horses, and great attention was bestowed on the breeding and training of the steeds. They were richly caparisoned, and their heads were frequently adorned with plumes of ostrich feathers. The Egyptian chariots had usually a quiver and bow-case fixed outside them, which were decorated with extraordinary taste and skill, so that they contributed very much to the picturesque effect of the chariot. The cover of the quiver was frequently fashioned into the head of some animal, and the sides of it were covered with embossed leather, or inlaid with variegated woods and ivory. The Hebrews did not make so much use of the bow as the Syrians and Egyptians. We find that one of the earliest improvements made by David after his accession, was the formation of a company of archers, which he levied from the tribe of Judah. In close combat the Egyptian cha-

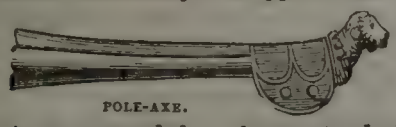


QUIVERS.

rioteers used either the curved sword, commonly called the falchion, or a heavy and formidable weapon,

FALCHION.

similar to the pole-axe of the middle ages; and as the cars were hung low, the warrior in the chariot could easily cut down an enemy who opposed him on foot.



POLE-AXE.

Chariots were regarded as the most valuable part of an army's equipment in ancient times, and those of Egypt were particularly celebrated. The number with which Pharaoh pursued the Israelites is very remarkable, for six hundred are mentioned as "chosen chariots," that is, such as were used by kings, nobles, and eminent warriors, which must, of course, have been only a small proportion of "all the chariots of Egypt." The Scriptural expression, that there were "captains over every one of the chariots," seems to intimate that the use of these vehicles was restricted to warriors of high rank, and this is confirmed by the monuments, which do not exhibit soldiers of the lower castes mounted in chariots.

It is generally believed that the use of war-chariots was anterior to that of cavalry or mounted horsemen. Homer mentions chariots only in all his descriptions of the battles round the walls of Troy. It is indeed very probable, that the notion of employing cavalry arose from the custom of bringing spare horses, as relays for the steeds which were either wearied from drawing the chariots or wounded in battle. This opinion is greatly strengthened by the account given of the entrance of the Egyptians into the dry bed of the Red Sea.

And the Egyptians pursued, and went in after them to the midst of the sea, even all Pharaoh's horses, his chariots, and his horsemen. (Exod. xiv. 23.)

The word rendered "horsemen" may, with more propriety, be translated charioteers, and the horses, which are mentioned distinct from the chariots, were probably the relays. Even so late as the days of Ahab, we find that chariots were preferred to cavalry, for when Benhadad, king of Syria, was about to invade Israel, his servants advised him,—

Do this thing, Take the kings away, every man out of his place, and put captains in their rooms: And number thee an army, like the army that thou hast lost, horse for horse, and chariot for chariot: and we will fight against them in the plain, and surely we shall be stronger than they. And he hearkened unto their voice, and did so. (I. Kings xx. 24—28.)

The horses here mentioned are clearly designed for the service of the chariots, and not for mounted cavalry. From Isaiah indeed we learn, that the Medes and Persians were the first nation that employed cavalry in aid of the corps of chariots, for in the beautiful description of the destruction of Babylon, we find that the circumstance which proved that the Assyrians must have been overthrown, was that the watchman saw a couple of horsemen accompanying a chariot.

Thus hath the Lord said unto me, Go, set a watchman, let him declare what he seeth. And he saw a chariot with a couple of horsemen, a chariot of asses, and a chariot of camels; and he hearkened diligently with much heed: And he cried, A lion: My lord, I stand continually upon the watchtower in the daytime, and I am set in my ward whole nights: And, behold, here cometh a chariot of men, with a couple of horsemen. And he answered and said, Babylon is fallen, is fallen; and all the graven images of her gods he hath broken unto the ground. (Isai. xxi. 6—9.)

This very simple explanation removes many of the difficulties which commentators have noticed in this remarkable prophecy; it has been asked, "how could it be known, from the appearance of a chario and a couple of horsemen, that Babylon had fallen?" The answer is, that the Assyrians and Babylonians never employed horsemen in conjunction with chariots, and hence this circumstance showed that the approaching chariot belonged to a different nation. And this is further confirmed by the prophet's direct description of the Persian army; "Elam (Persia,) bare the quiver with chariots of men and horsemen," (Isaiah xx. 6); a description which is confirmed by Xenophon, who declares that the three great lessons taught to the Persian youth, were "to use the bow, to manage the horse, and to speak truth."

The catastrophe of the Egyptian army is told in a few words by the sacred historian.

And the Lord said unto Moses, Stretch out thine hand over the sea, that the waters may come again upon the Egyptians, upon their chariots, and upon their horsemen. And Moses stretched forth his hand over the sea, and the sea returned to his strength when the morning appeared; and the Egyptians fled against it; and the Lord overthrew the Egyptians in the midst of the sea. And the waters returned, and covered the chariots, and the horsemen, and all the host of Pharaoh that came into the sea after them; there remained not so much as one of them. But the children of Israel walked upon dry land in the midst of the sea; and the waters were a wall unto them on their right hand, and on their left. Thus the Lord saved Israel that day out of the hand of the Egyptians; and Israel saw the Egyptians dead upon the sea shore. (Exodus xiv. 26—30.)

It has been sneeringly asked by infidels, "how it happens that no direct evidence of this great event has been discovered on the monuments?" We have already anticipated a great part of a satisfactory reply. The Pharaoh by whom the Israelites were persecuted and pursued, was a foreign intruder and conqueror, with whose fate the native Egyptians had no sympathy; and it may be added, that the monuments of Lower Egypt, where the Israelites abode, have not yet been explored, all the antiquities yet developed by the researches of travellers having been found in Middle and Upper Egypt. But the monuments of Middle Egypt afford some indirect confirmation of the overthrow of the intrusive Pharaoh, for they show us that the Hyksos, who had long tyrannized over the land, were, by some sudden event, reduced to such a state of weakness, that they were expelled with very little difficulty. Now such an event was most probably the sudden destruction of their best warriors in the Red Sea, which rendered them unable any longer to maintain their supremacy over the native Egyptians. And this view of the subject is confirmed by a remarkable direction given by Moses, in his recapitulation of the law, a little before his death, which took place many years after the Hyksos had been expelled from Egypt. He said to the congregation, "Thou shalt not abhor an Egyptian, because thou wast a stranger in his land." (Deut. xxiii. 7.) A very remarkable expression, which seems to draw a clear distinction between the native Egyptians and the intrusive conquerors by whom the Israelites were oppressed. Indeed we shall see in many subsequent examples, that so far from there being anything like an hereditary hatred between the Israelites and the Egyptians, the two nations evinced the most friendly dispositions towards each other, while an inveterate animosity existed between the Israelites and the Amalekites, who certainly belonged to the same race as the Hyksos.

ON THE DISPERSION OF SEEDS.

This problem has been executed in six different ways at least, more or less simple. These are, the exaltation of the seeds of plants on elastic stems, so as to be exposed to the action of the winds; a power of floating through water till they meet a point of attachment; their transportation by animals to which their receptacles or investments have served as food; transportation by the coats of animals; a provision in the form of wings, through which the winds may act more effectually on them; and lastly, an elastic power in their receptacle, through which they are forcibly rejected by the parent plant.

The first contrivance is so general, and appears to be so necessary a portion of the structure of the plant, that its design for the end in question is seldom noticed. Yet he who examines the grasses will not doubt of the consequences produced by the exaltation and elasticity of the stem, though he should choose to doubt that the dispersion of seeds was at least one end in view. In the mosses this intention can scarcely be questioned, since no other purpose can be assigned to the delicate and elastic foot-stems by which the seed-vessels are elevated above the plant. In these the flower blows in the bosom of the leaves; and almost everywhere else, throughout the vegetable world, where the flower blows, there does the seed also ripen, and thence is it dispersed. Here it is not so: the seed-vessel becomes raised far beyond the place of the flower, through the subsequent growth of a singularly elastic stem, there to ripen its contents, and to be exposed to those forces which may disperse widely as the winds themselves, those seeds which, light as the breeze that bears them, are of such high importance in the great economy of vegetation.

If the floating of seeds through water is a contrivance which, like the action of the winds, appears too much akin to what we carelessly term accident, to deserve notice: yet thus chiefly are the naked coral rocks of the great Pacific Ocean clothed with vegetation, and rendered fit for the habitation of man. Are we entitled to give the name of accident to that cause, or combination of causes, by which so great an end is produced, even though metaphysics, and religion equally, did not show that there can be no accident to the Creator and Governor of all things? The buoyancy of a cocoa-nut, the resisting investments, and the vitality of seeds, were not necessities; but there can be no accident when the end in question is thus attained; and when, without it, all those previous and wonderful contrivances by which these islands are created in the ocean would have been useless, while we can even believe that the important cocoa-palm was created a maritime plant for this very purpose. As much is it accident, that the same fluid which produces fire and maintains the life of animals, is also the highway of a bird through the clouds, and the moving power of a ship across the ocean; but this question will be set at rest, by producing a distinct provision for securing the end proposed in the transportation of seeds through water.

And this is found in the seeds of the submarine plants. These might have been carried any whither: but how were the seeds of the *fuci* to root themselves amid the waves? The contrivance is equally simple and effectual. They are surrounded by a mucilage which water cannot dissolve, and which enables them to adhere to whatever solid body they touch.

Nor is this the only subsidiary contrivance to prove that the power of water is one of the agents which the Creator has intentionally adopted for the dispersion of seeds. The down of the willow-seed is both its ship and its balloon: the tree is the inhabitant of rivers; and thus it is contrived that both the winds and the water shall convey its posterity, even to distant regions.

There is a rudeness of expedient, it may be said, and equally an appearance of accident, in ordering that the seeds of plants shall be dispersed through the coats and wanderings of animals. But neither was this undesigned, when the provisions for that end in the structure of the seeds in question are so remarkable, and often so accurately mechanical. All know the hooks on the bur, and those on the seeds of the adhesive galium and the geum, as all can equally see or infer the consequences: while the carrot, and others of the umbelliferous plants, afford further examples of an expedient, to which neither intention nor mechanical contrivance can be denied.

If there is at first sight a similar appearance of accident in dispersing the seeds of plants through the digestive organs of animals, the intention is here also rendered evident, by a still more complicated system of contrivance.

The fruit is the food of the animal; but the seed is protected from the action of the digestive powers by its investments; as it is also empowered to defy the animal chemistry by its vitality, even appearing to be thus quickened for its peculiar destination. Nor let this mode of dispersing seeds be thought of small moment; since it is one of the roads through which the coral islands become clothed with that vegetation which has rendered them what they now are.

But the following contrivances are so obviously mechanical, that it is impossible to doubt the design, or to avoid admiring the beauty and ingenuity of the mechanisms. If, in the case of the winged seeds, aid is derived from the adventitious power of the winds, the variety of resource through which that is brought into action is well deserving of attention.

The lime and the ash offer instances of wings, of the simplest nature; and in the seeds of the fir tribe there is a similar contrivance, but of a more delicate structure. But the far greater number of these mechanisms are produced from down, various in disposition as in strength; and often presenting arrangements of singular beauty and delicacy. There is no one of those structures more beautiful than that which occurs in the dandelion. Let him who can doubt that the most exquisite art designed and executed this most common, but not less wonderful piece of mechanism, examine a single star with its attached seed, the lengths of the stems, the mode of their divergences from the receptacle, and that accuracy in those divergences, which causes the edge of each star so to unite, that a continuous surface is the consequence, and neither interval nor irregularity exists. But that surface also forms a globe: while this must result, not merely from the distribution of the seeds, but from a mode of expansion in the receptacle, on drying, which, if aught ever appears to be casual and uncertain, would seem to be under the guidance of chance alone. Nothing appears intended here, yet the end is ever gained: and far more remarkably still is it gained, when not one of these receptacles is globular, nor even of a spherical surface; and when, beyond all this, few are in any manner regular in their forms, while scarcely any two are rigidly alike. Yet the result is ever the same. Be the receptacle what it may, the downy surface is a globe: while we can at least see that this was necessary, since thus it is enabled to evade, till the seeds are ripe for dispersion, the winds which would otherwise have carried them prematurely off, and defeated the Creator's intention. He who can look even at

this common and despised object, and not see in it a power which baffles all calculation, added to the most consummate art, may cease to study the Creator's works, for creation can teach him nothing. Even he who rejects or disdains these higher thoughts, should cease to pride himself on his talents for observation and reflection, if he is not struck by the efficacy of this most artificial and beautiful structure, for the intended ends; seeing that the storm passes over it unfelt, till the hour of its ultimate destiny is arrived.

The last provision of contrivances for dispersing the seeds of plants is founded on that most inexplicable property of matter, elasticity, so largely used throughout all creation: and it is the most purely mechanical, since it depends upon no extraneous aid. Under this principle the seed-vessel, or some part connected with it, is provided with a latent spring, to be brought into action as soon as the seeds are fit for dispersion, and not before. It is either incomplete, or dormant, under a detent or check, like the spring of a gun-lock. This alone is an ample proof of design; because it is a train long laid, and implying foresight. And the action of the spring is prepared as gradually as the ripening of the seed, under an adaptation equally bespeaking the nicest care; while the detent, when present, is also formed in a special part of the seed-vessel, destined to give way when its services are no longer wanted, or would be prejudicial.

In the Cardamine impatiens, and hirsuta, the valves of the pod are detained at the point, and they discharge the seeds with great force, by curling back when disengaged. In the Geraniums, the long beak of the seed forms the spring, and the detent is at the seed-vessel, which is also contrived to be but half a capsule, that its contents may escape. In the Broom, the crackling of which in a hot day is familiar, each valve recoils in a spiral direction when the detent yields, as is the case with many of this tribe: and in some of the familiar ferns it is also the recoiling elasticity of a spring, under different modes, which produces the desired effect.

The peculiarity of circumstances under which a similar invention in the Mesembryanthemums acts, adds much to our impression of the wisdom and foresight that have been exerted on this subject. In all the preceding instances, it is through the drying of the parts that the springs are brought into action: but had this been the case with that plant of the desert, the seeds would have fallen on an arid sand, and have failed. It is therefore commanded that the springs which have been constructed in the calyx, should close in dry weather, and open on the occurrence of moisture. Thus also is it with the rose of Jericho (*Anastatica*), where the seed-vessel is rolled along the sands by the winds, until, meeting with a moist spot, it opens and parts with its seeds in that only place amid the parched plain where provision has been made for their vegetation. Can anything have been neglected, where calculations so minute as this exist? And can this be aught but the result of thought and design, as of universal knowledge and perfect foresight?

These are contrivances for a great and valuable end, which we can especially appreciate, because we can compare them with our own designs: and as well might the inventor of the catapult and the cross-bow doubt his own ingenuity and intentions as those of the Creator.

[Abridged from Macculloch's *Proofs and Illustrations of the Attributes of God.*]

INVENTION OF THE MICROSCOPE AND THE TELESCOPE.

It has been well observed that about the same time when the invention of the telescope showed us that there might be myriads of other worlds claiming the Creator's care, the invention of the microscope proved to us that there were in our own world myriads of creatures, before unknown, which this care was preserving. While one discovery seemed to remove the Divine Providence further from us, the other gave us most striking examples that it was far more active in our neighbourhood than we had supposed: while the first extended the boundaries of God's known kingdom, the second made its known administration more minute and careful.

It appeared that in the leaf and in the bud, in solids and in fluids, animals existed hitherto unsuspected: the apparently dead masses and blank spaces of the world were found to swarm with life. And yet, of the animals thus revealed, all, though unknown to us before, had never been forgotten by Providence. Their structure, their vessels and limbs, their adaptation to their situation, their food and habitations, were regulated in as beautiful and complete a manner as those of the largest and apparently most favoured animals. The smallest insects are as exactly finished, often as gaily ornamented, as the most graceful beasts, or the birds of brightest plumage. And when we seem to go out of the domain of the complex animal structure with which we are familiar, and come to animals of apparently more scanty faculties, and less developed powers of enjoyment and action, we still find that their faculties and their senses are in exact harmony with their situation and circumstances; that the wants which they have are provided for, and the powers which they possess called into action. So that Müller, the patient and accurate observer of the smallest and most obscure microscopical animalcula, declares that all classes alike, those which have manifest organs, and those which have not, offer a vast quantity of new and striking views of the animal economy, every step of our discoveries leading us to admire the design and care of the Creator. We find, therefore, that the Divine Providence is, in fact, capable of extending itself adequately to an immense succession of tribes of beings, surpassing what we can image or could previously have anticipated; and thus we may feel secure, so far as analogy can secure us, that the mere multitude of created objects cannot remove us from the government and superintendence of the Creator.—Whewell.

PHOSPHORIC LIGHT EMITTED BY FLOWERS.

In the garden of the Duke of Buckingham, at Stowe, on the evening of Friday, September 4th, 1835, during a storm of thunder and lightning, accompanied by heavy rain, the leaves of the flower called (*Enothera macrocarpa*, a bed of which is in the garden, immediately opposite the windows of the manuscript library at Stowe, were observed to be brilliantly illuminated by phosphoric light. During the intervals of the flashes of lightning, the night was exceedingly dark, and nothing else could be distinguished in the gloom except the bright light upon the leaves of these flowers. The luminous appearance continued uninterruptedly for a considerable length of time: it did not appear to resemble any electric effect; and the opinion which seemed most probable was, that the plant, like many known instances, has a power of absorbing light, and giving it out under peculiar circumstances.—*Magazine of Popular Science.*

How difficult a thing it is to persuade a man to reason against his own interest, though he is convinced that equity is against him.—Trusler.

NOTES ON FOREST TREES. No. XXIII.

LEAF AND FRUIT OF THE CAMPHOR TREE.

The Camphor Tree, (*Dryobalanops camphora.*)

The celebrated Camphor Tree of Sumatra is one of the largest trees of the forests of that island; it is also found in Borneo, and several other eastern islands of the East Indian Archipelago. The greatest part of the Camphor, however, which is brought to Europe, is produced by a species of laurel (*Laurus camphora*). That which is afforded by the tree now under notice, seldom reaches our market, being carried chiefly to China, where it fetches a very high price. That which is received in England comes from Japan, in casks and chests.

The Camphor yielded by the *Dryobalanops camphora*, is found occupying portions of about a foot, or a foot and a half, in the heart of the tree. The natives, in searching for the camphor, make a deep incision in the trunk, about fourteen or eighteen feet from the ground, with a *billing*, or Malay axe, and when it is discovered, the tree is felled, and cut into junks a fathom long. The same tree yields a liquid or oily matter, which has nearly the same properties as the camphor, and is supposed to be the first stage of its formation. The precise age when this tree begins to yield camphor has not yet been satisfactorily ascertained, but the young trees are known to yield only oil, that is, camphor in a liquid state.

The method of extracting the oil, is by making a deep incision with a small aperture, into the body of the tree, and the oil, if any, immediately gushes out and is received in bamboos. The product of a middling-sized tree is about eight China *catties*, or about eleven pounds, and a large tree will yield nearly double that quantity. It is said that trees which have been cut for the purpose of obtaining the oil, and left standing in that state, will often produce camphor eight or ten years after, but it is of an inferior quality.

Camphor is also prepared, in China, from the leaves and branches of a tree, called by the Chinese *tchang*. They take some branches fresh from the tree, chop them very small, and lay them to steep in spring-water for three days and three nights. After they have been soaked in this manner, they are put into a kettle, where they are boiled for a certain time, during which they are kept constantly stirred with a stick made of willow. When they perceive that the sap of these small chips adheres sufficiently to the stick in the form of a white frost, they strain the whole, taking care to throw away the dregs and refuse. This juice is afterwards poured gently into an earthen basin, well varnished, in which it is suffered to remain one night. Next morning it is found coagulated and formed into a solid mass. To purify this first preparation, they procure some fine earth, which, when pounded and reduced to a very fine powder, they put into the bottom of a basin made of copper; over this layer of earth they spread a layer of camphor, and continue thus until they have laid four strata. The last, which is of very fine earth, they cover up with the leaves of the penny-royal plant; and over the whole they place another basin, joining it very closely to the former by means of a kind of red earth that cements their brims together. The basin, thus prepared, is put over a fire, which must be managed so as to keep up an equal heat: experience teaches them to observe the proper degree. But above all they must be very attentive lest the plaster of earth which keeps the basins together should crack or fall off, as in that case the spirit would evaporate, and the whole process be spoiled. When the basins have been exposed to the necessary heat, they are taken off, and left to cool; after which they are separated, and the sublimated camphor is found adhering to the cover. If this operation be repeated two or three times, the camphor is found purer, and in larger pieces. Whenever it is necessary to use any quantity of this substance, it is put between two earthen vessels, the edges of which are surrounded with several bands of wet paper. These vessels are kept for about an hour over an equal and moderate fire; and when they are cool, the camphor is found in its utmost perfection, and ready for use.

The Greeks and the Romans appear to have been unacquainted with this valuable drug, and we are indebted to the Arabians for a knowledge of it. The chemical properties of Camphor are thus described.—"Camphor is a vegetable substance, of an oily nature, combustible, odoriferous, volatile, concrete, and crystalline." Its smell is strong and penetrating; its inflammable nature is so great, that it will burn when floating on the surface of water. A curious rotatory movement takes place among small particles of Camphor when sprinkled on the surface of water; and if a cylindrical piece of Camphor is partly plunged in the liquid, it is dissolved, not equally over the whole immersed portion, but with great rapidity at that part which is on a level with the surface of the water. Camphor is much used in the preservation of subjects of natural history from insects; its powerful odour destroys the more minute species, and deters the larger from approaching, and it is also used in medicine as a sedative.

The beautiful system of sun, planets, and comets, could have its origin in no other way than by the purpose and command of an intelligent and powerful Being. He governs all things, not as the soul of the world, but as the lord of the universe. He is not only God, but Lord or Governor: we know him only by his properties and attributes, by the wise and admirable structure of things around us, and by their final causes; we admire him on account of his perfections, we venerate and worship him on account of his government.—Sir Isaac Newton.

Living in an age of extraordinary events and revolutions, I have learned from thence this truth, which I desire might thus be communicated to posterity; that all is vanity which is not honest, and that there is no solid wisdom but in real piety.—Evelyn's *Epitaph by himself.*

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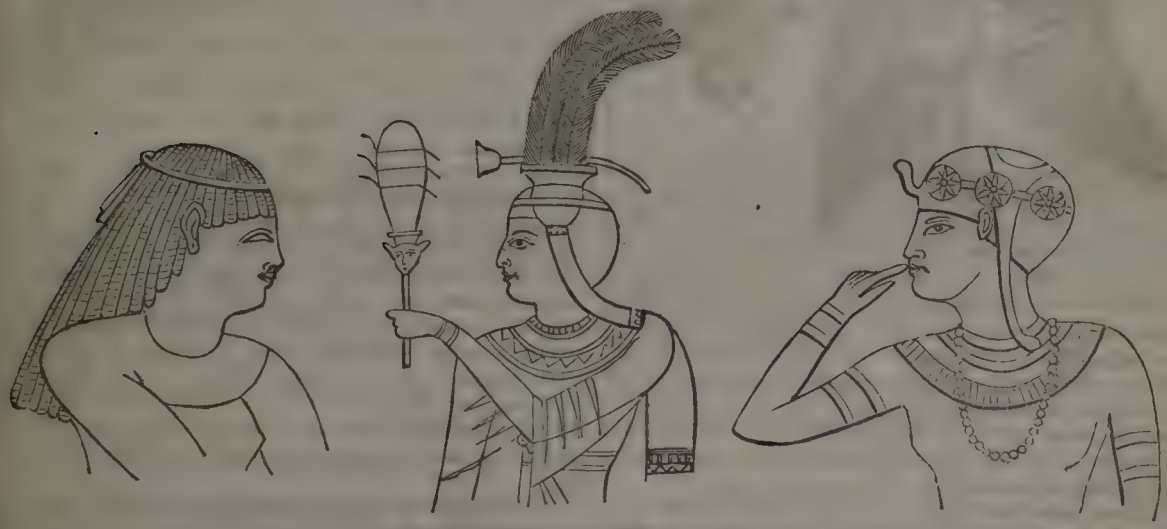
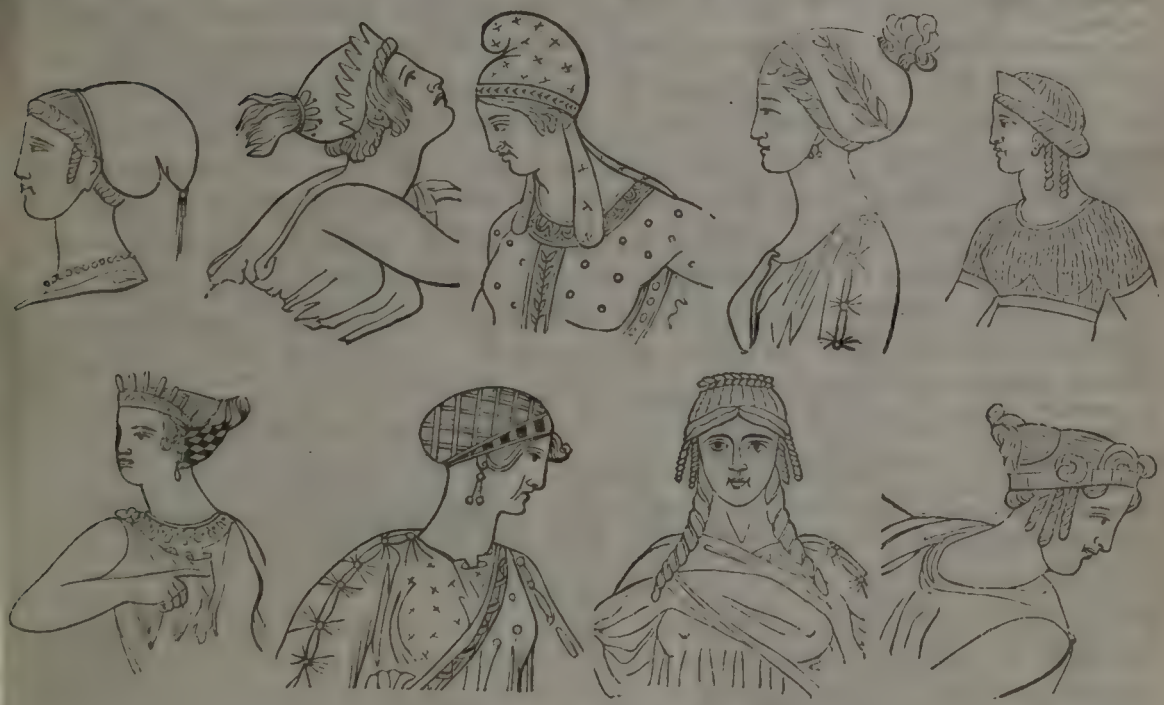


HEAD-DRESSES OF EGYPTIAN LADIES.



HEAD-DRESSES OF GRECIAN LADIES.

HEAD-DRESSES OF ROMAN LADIES.

ON WIGS AND HEAD-DRESSES.

No. III.

The Head-Dresses of Females.

The arrangement of the hair, and the decoration of the head, have, in all ages, been objects of great attention among females, and the extravagance into which they have been led, in decorating this part of the person, has often been a subject of severe reproof. We meet with many instances of this in the Sacred volume, where the vanities of the Jewish women are particularly alluded to.

The Jews, originally a pastoral people, acquired a taste for this method of ornamenting the person through their intercourse with the Egyptians, and with the Asiatic nations. There are no known Jewish monuments to which we can refer, but we may gather much information on the subject from the remains of Egyptian antiquity, for there is little doubt the fashions of the Jews were mostly borrowed from the people of that nation. We have already given a representation of an ancient Egyptian wig*, but this kind of head-dress was seldom worn without a variety of ornaments being at the same time added; these consisted of fillets of gold, ribands of the brightest colours, flowers, particularly the lotus, of which they were extremely fond; in some cases feathers, together with enormous ear-rings, necklaces, elegantly painted collars, &c.

The first three figures in the engraving are head-dresses of Egyptian females. The figure to the left shows the usual mode of wearing a wig, resembling that we have already figured; the only ornament being a narrow fillet round the crown of the head. The central figure is much more gaudily attired, and was probably an assistant at some religious ceremony; in her hand she holds a musical instrument, called a *sistrum*. The feathers which surmount the head-dress are variegated with green and red, an artificial lotus forms part of the ornament, fixed in a golden support; a golden fillet binds the hair, which is black; the ornament which hangs over the shoulder is of blue and gold, and the collar is elegantly worked or painted. The right-hand figure has her head covered with a cap, of a delicate fabric, and of a bright-blue colour; the rosettes of the fillet are of gold, and the ornament that depends from the top of the head is black; the ornament is in the form of a serpent.

The next nation of antiquity to which we can refer on this subject is the Greeks, and the good taste of the Grecian ladies is eminently conspicuous in the adornment of the head. At first, as appears both from ancient sculpture and paintings, men and women alike wore their hair descending partly before and partly behind, in a number of long separate locks, either of a flat and zig-zagged, or of a round and corkscrew shape. A little later it grew into fashion to collect the whole of the hair hanging down the back, by means of a riband, into a single broad stream, and only to leave in front, one, two, or three long narrow locks hanging down separately; and this is the head-dress which Minerva, "a maiden affecting old fashions and formality, never seems to have quitted." Later still the queue depending down the back was taken up, and doubled into a club, and the side-locks only continued to reach in front as low down as the bosom. But these also gradually shrunk away into a greater number of smaller tufts or ringlets, hanging down about the ears, and leaving the neck quite unconfined. So neatly was the hair arranged in both sexes round the forehead, and in the males round the chin, as sometimes to resemble the cells of a bee-hive, and at others waves and undulations, executed in wirework.

Ladies reckoned among the ornaments of the head the tiara, or crescent-formed diadem, and ribands, rows of beads, wreaths of flowers, nettings, fillets, skewers, and gew-gaws innumerable. Ear-rings of various shapes, necklaces in numerous rows, and various other trinkets, were in great request. The Roman ladies followed, to a certain extent, the fashions of the Greeks, but they seem rarely to have worn the tiara, or the net to support the hair; their mode of dressing the hair was less elegant but more elaborate, being frequently arranged in a vast number of small curls; for this purpose they made use of a hot iron, called *calamistrum*, and this instrument appears to have been in use among the Grecian as well as the Roman ladies. Tiaras, pins, and other articles for the decoration of the head, have been found among the ruins of Pompeii. The Roman ladies, whose hair is generally black, were extremely fond of light and auburn hair, which was brought to Rome from Germany and the northern parts of Europe. Ovid, and other Latin poets, frequently allude to this practice, and to the employment of a German nostrum to cause the hair to grow,—

> Say that by age, or some great sickness had,
> Thy head with wonted hair be thinly clad;
> Falling away like corn from ripened sheaves,
> As thick, as Boreas blows down Autumn leaves.
> By German herbs thou may'st thy hair restore,
> And hide the bare scalp that was bald before.
> Women have known this art, and of their crew
> Many false colours buy, to hide the true;
> And multitudes, yea, more than can be told,
> Walk in such hair as they have bought for gold.
> Hair is good merchandise, and grown a trade,
> Markets and public traffic thereof made
> Nor do they blush to cheapen it among
> The thickest number, and the rudest throng.

The same poet also ventures to give the ladies instruction as to the dressing of their hair.

> A long and slender visage best allows
> To have the hair part, just above the brows;
> So Laodameia, surnamed the fair,
> Used, when she walked abroad, to truss her hair.
> A round plump face must have her trammels tied
> In a fast knot above, her front to hide;
> The wire supporting it, whilst either ear,
> Bare and in sight, upon each side appear.
> Some ladies' locks about their shoulders fall,
> And hanging loose, become them best of all.
> * * * * *
> More leaves the forest yields not from the trees,
> More beasts the Alps breed not, nor Hybla bees,
> Than there be fashions of attire in view,
> For each succeeding day adds something new.

* See *Saturday Magazine*, Vol. XII., p. 113.

THE LIMITED POWER OF MAN.

Man can construct exquisite machines, can call in vast powers, can form extensive combinations, in order to bring about results which he has in view. But in all this he is only taking advantage of laws of nature which already exist; he is applying to his use qualities which matter already possesses. Nor can he by any effort do more. He can establish no new law of nature which is not a result of the existing ones. He can invest matter with no new properties which are not modifications of its present attributes. His greatest advances in skill and power are made when he calls to his aid forces which before existed unemployed, or when he discovers so much of the habits of some of the elements as to be able to bend them to his purpose. He navigates the ocean by the assistance of the winds, which he cannot raise or still:

and even if we suppose him able to control the force of these, his yet unsubjugated ministers, this could only be done by studying their characters, by learning more thoroughly the laws of air, and heat, and moisture. He cannot give the minutest portion of the atmosphere new relations, a new course of expansion, new laws of motion. But the Divine operations, on the other hand, include something much higher. They take in the establishment of the laws of the elements, as well as the combinations of these laws, and the determination of the distribution and quantity of the materials on which they shall produce their effect. We must conceive that the Supreme Power has ordained that air shall be rarefied, and water turned into vapour by heat; no less than that he has combined air and water, so as to sprinkle the earth with showers, and determined the quantity of heat, and air, and water, so that the showers shall be as beneficial as they are.

We may and must, therefore, in our conceptions of the Divine purpose and agency, go beyond the analogy of human contrivances. We must conceive the Deity, not only as constructing the most refined and vast machinery with which the universe is filled; but we must also imagine him as establishing those properties by which such machinery is possible: as giving to the materials of his structure the qualities by which the material is fitted to its use. There is much to be found, in natural objects, of the same kind of contrivance which is common to these and to human inventions: there are mechanical devices, operations of the atmospheric elements, chemical processes. Many such have been pointed out; many more exist. But besides these cases of the combination of means, which we seem able to understand without much difficulty, we are led to consider the Divine Being as the *author of the laws* of chemical, of physical, and of mechanical action, and of such other laws as make matter what it is; and this is a view which no analogy of human inventions, no knowledge of human powers, at all assists us to embody or understand. Science, therefore, while it discloses to us the mode of instrumentality employed by the Deity, convinces us, more effectually than ever, of the impossibility of conceiving God's actions by assimilating them to our own.—WHEWELL.

MUSIC

MUSIC, though now a very complex and difficult art, is, in truth, a gift of the Author of Nature to the whole human race. Its existence and influence are to be traced in the records of every people from the earliest ages, and are perceptible, at the present time, in every quarter of the globe. It is a part of the benevolent order of Providence, that we are capable of receiving from the objects around us, pleasures independent of the immediate purposes for which they have been created. Our eyes do not merely enable us to see external things, so as to avail ourselves of their useful properties; they enable us also to enjoy the delight produced by the sensation of *beauty*, a perception which (upon whatever principle it may be explained), is something distinct from any consideration of the mere utility of an object. We could have had the most accurate perceptions of the form and position of everything that constitutes the most beautiful landscape, without receiving any idea of its beauty. We could have beheld the sun setting amid the glowing tints of a summer evening, without thinking of anything beyond the advantage of serene weather; we might have contemplated the glossy expanse of the ocean, reflecting the tranquil beams of the moon, without any other feeling than the comfort of a safe and easy navigation; and the varieties of hill and dale, of shady woods and luxuriant verdure, might have been pleasant only in the eyes of farmers and graziers. We could, too, have listened to *sounds* with equal indifference to everything beyond the mere information they conveyed to us; and the sighing of the breeze, or the murmuring of the ocean, while we learned nothing from them of which we could avail ourselves, might have been heard without pleasure. It is evident that the perception of external things, for the mere purpose of making use of them, has no connexion with the feeling of their beauty; and that our Creator, therefore, has bestowed on us this additional feeling, for the purpose of augmenting our happiness. Had he not had this design, he might have left us without the sense of beauty or deformity. "If God," says Paley, "had wished our misery, He might have made sure of his purpose, by forming our senses to be as many sores and pains to us, as they are now instruments of our gratification and enjoyment; or by placing us among objects so ill-suited to our perceptions, as to have continually offended us, instead of ministering to our refreshment and delight. He might have made, for instance, everything we saw loathsome, everything we touched a sting, and every sound a discord."

In place of every sound being a discord, the greatest part of the sounds which we hear are more or less agreeable to us. The infinite variety of sounds produced by the wind and waters, the cries of animals, the notes of birds, and above all, the tones of the human voice, all affect us with various kinds and degrees of pleasure; and, in general, it may be said, that it is such sounds as indicate something to be feared and avoided, such as the howling of wild beasts, or the hissing of serpents, that are positively painful to our ears. In this sense all nature may be said to be full of music, the disagreeable and discordant sounds being (as in artificial music), in such proportion only as to heighten the pleasure derived from those which are agreeable. The human voice is that which pleases us chiefly, and affects us most powerfully. Its natural tones and accents are calculated to penetrate the heart of the listener, and the union of these to articulate speech, in every language, not only produces a melody which pleases the ear, but an effect on the feelings, of which the mere words would be incapable. These natural tones of the voice, either by themselves, or joined to articulate language, constitute music in its simplest state; and the pleasures and feelings derived from such music must necessarily have existed in every form of society.—HOGARTH'S *Musical History*.

THE USEFUL ARTS. No. XXXVI.

THE CARPENTER. 2.

WHEN a timber-tree is cut down, the branches, arms, and boughs, are cut off and the bark stripped, this being valuable for many purposes. The trunk is then sawed square, and again cut into *planks*, *deals*, *battens*, &c., as the different sized boards into which it is reduced are called.

Teak and mahogany is imported into this country in *logs*, distinguished from the long beams known technically as *timber*, by their width and thickness, being considerable, in proportion to their length.

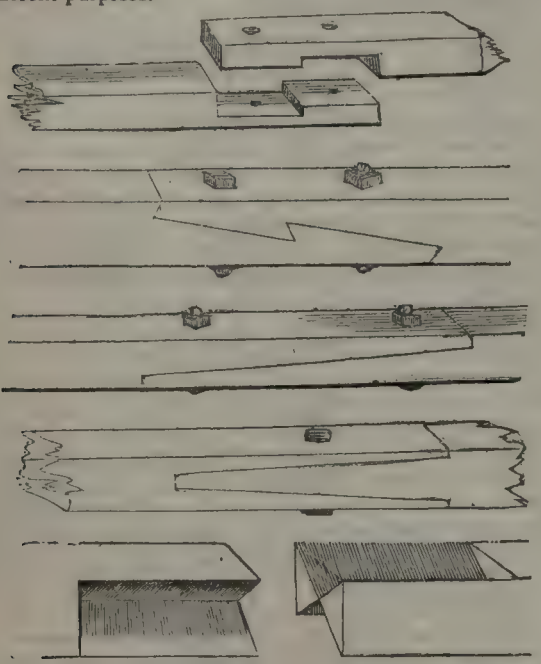
Timber is sawed in countries producing, or using it, in great quantities in saw mills, in which the tools are worked by water or steam. From four to six long saws are set parallel to each other in a frame, and at the distance apart of the thickness of the planks into which the timber is to be cut. These frames of saws are moved vertically up and down by the machinery, the timber lying horizontally on a frame-work, and being pushed gradually along by the ma

chinery, to keep the saws in action as they cut through it, the saws always remaining in one place.

Wood is also sawed into battens, laths, &c., by circular saws, turned by machinery, like a lathe.

When timber is sawed by hand, it is done by two men acting in concert in the following manner. A pit is generally chosen, round the margin of which a stout frame is laid. The beam to be sawed is laid lengthwise to the pit on this frame, in the centre, and one man stands on the beam while another is in the pit below him, each alternately raising or pulling down a large vertical saw, with which they saw the beam lengthwise into planks. Wedges of wood are placed by them in the fissure as they proceed, to keep the cut open, and thus allow the saw to play freely. This is excessively hard labour, especially to the upper man, who has not only to raise the weight of the saw in the up-stroke, but to guide it correctly along the chalked line on the beam. This man gets higher wages, and is called the *Top-sawyer*, a term technically given in jest to any one who is, or fancies himself, of importance.

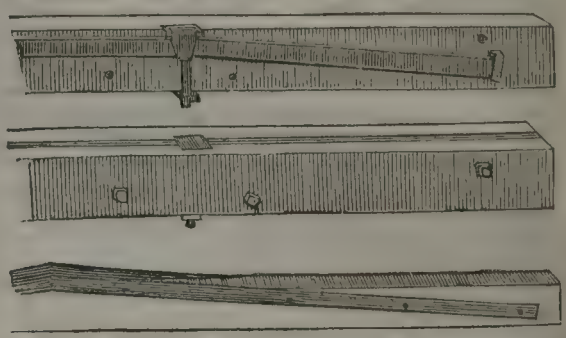
When timber is wanted in lengths exceeding those that can be procured from the tree in one piece, it must be joined by what is called *scarfing;* that is, the ends of the two lengths that are to be united into one, are cut so that a portion of the one may lap over and fit into a portion of the other which is cut so as to receive it, the timber, when united, being of the same uniform size. The joined ends are secured together by bolts or spikes. The annexed are figures of the more usual modes of scarfing timber for different purposes.



The last is a mode of scarfing invented by Mr. Roberts, of the Royal Dock Yards.

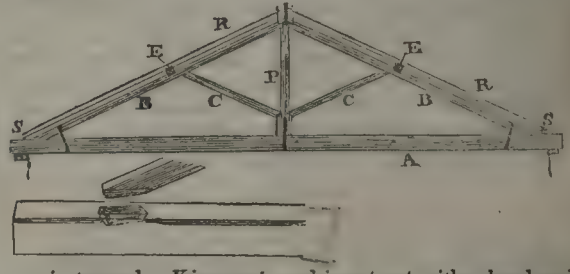
When a beam of timber is long in proportion to its breadth and thickness, it will bend by its own and will be incapable of supporting much additional weight; it may be strengthened by *trussing*, in different modes, of which we will only describe that usually adopted for girders, intended for floors. The beam is sawed longitudinally into two equal beams, each, of course, half the thickness of the original, these halves are reversed, end for end, so that if there were any weak part in the original beam, this may be divided equally between the ends of the compound beam made up of the two halves when bolted together. A flat *truss*, usually of oak, with iron *king-bolts* and abutting plates, resembling in form and principle, a timber roof or bridge, is placed between the two half beams, and let into a shallow groove cut in each half to receive it; the compound beam, with this truss in the middle, is then bolted together again by means of iron bolts with washers and nuts, and consequently becomes rigid by the construction of the truss. The truss is not entirely let into the double beam, as the full effect of strength may be obtained without the necessity for cutting the groove in each half beam, of half the thickness of the oak truss; consequently, when the girder is completed, there is a slit all along it, through which the truss is seen lying in its place between the two sides.

Iron trusses are often used instead of oak, and beams are frequently strengthened by screwing a thin flat iron truss on one or both sides, let into the beam for about half the thickness of the metal.



This mode of strengthening a beam by trussing, is only adopted in floors, where it is necessary to limit the depth of the truss to that of the beam, to obtain a level surface by means of joists laid across, and supported by, the beam. But it is obvious that much greater strength may be imparted to a long beam by making it the base of a triangular frame, as is done in roofs, in various manners, when the slanting sides of the triangular frame carry the battens or laths for supporting the tiles or other covering.

The annexed is the simplest form of a roof, and will help to explain the subject of carpentry in other respects. The beam A, called the *Tie-beam*, is of such a length as to rest on the side walls of the house at each of its ends, and is supposed to be of such dimensions in depth and thickness as would render it inadequate to support much more than its own weight. The two sloping rafters B B, are called *Principals;* they are *mortised* into the tie-beam at their ends by a joint, shown in the annexed figure, by which they are provided with a firm abutment to prevent the ends from slipping outwards, and in order to prevent the principal from starting upwards out of the mortise, it is strapped down to the tie-beam by an iron strap, bolted or screwed to both timbers.



P is termed a *King-post*, and is cut out with a head and foot, the former to receive the upper ends of the principals, which, being cut square, abut firmly against the sloping face of the head. The sloping principals hold up the king-post, and the tie-beam is supported from the latter by a stirrup-shaped strap, that goes under the beam and is bolted, or screwed, to the post on each side. To prevent the principals from bending by the strain, or by the weight of the roof-covering, the struts C C, are placed, abutting against the beveled part of the foot of the king-post, and are strapped to the principals, or mortised into them.

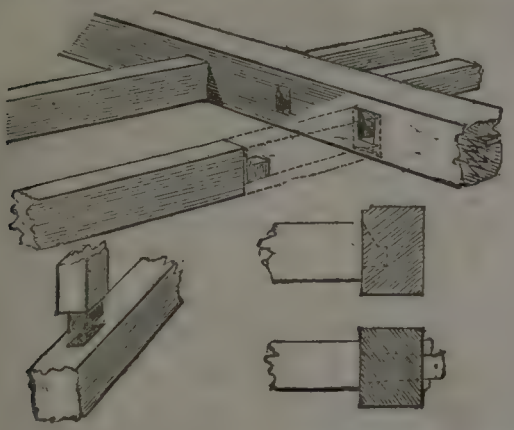
The number of tie-beams with their trusses, &c., of course depends on the length of the roof, or the material with which it is to be covered. A longitudinal *scantling*, or thin beam, called a *purline*, E, is laid lengthwise, resting on the principals over the ends of the struts, and is secured to the former by a spike, or else by being notched down on to the principal. These purlines support the common rafters R, which abut at their feet against a longitudinal scantling S, lying on, and *halved* down on, the tie-beams; at their upper ends, the rafters R rest against a *ridge-piece*, or thin plank, let edgeways into the head of the king-post. The rafters are placed about a foot apart, and on to them are nailed the laths or battens to carry the tiles or slates.

In constructing roofs, floors, and other structures of timber, the various beams are *framed*, or fastened together by certain processes calculated to insure strength and per-

manence in the framing, which ought to be understood, and their names remembered.

The *Mortise* and *Tenon* is used when one beam is to be attached to, and supported by, another, without resting on it, but so that the beams may be in the same plane. The mortise is a hole cut into, or through, the side of the one beam, into which hole the end of the other, cut down to fit the form of the hole, is inserted and fastened. It is obviously necessary to consider two things in determining the size and form of the mortise and tenon. First, that by the former the one beam may not be too much weakened, and yet that it should be large enough to give the tenon that fits into it, sufficient strength to enable the beam to carry the weight intended.

If the one beam is horizontal, and the other to stand perpendicularly upon it, the tenon need only be large enough to retain the upright beam in its place. The annexed are the most usual forms of mortises and tenons, and will explain their use and principle.

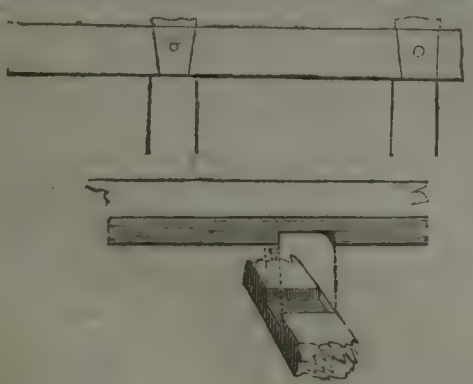


It is obvious that two mortises never should come opposite each other on the two sides of the same beam.

When the tenon comes through the beam, it is secured from drawing by a pin or peg put through it.

The *Dovetail* is used to secure one beam into another, when they have to resist any strain acting to draw them asunder, rather than to carry any weight; it is consequently employed to frame wall-plates, or the timber laid in walls to carry the ends of beams of floors, roofs, and so on, which plates tend to bind the walls together as well as receive the ends of the beams. The term is derived from the end of one beam being cut into a shape resembling the spreading tail of a bird which is pinned down in a corresponding wedge-shaped recess cut in the other beam to receive it. It is clear from this construction that no force, acting in the direction of its length, could pull the first beam out of the second without breaking off the dovetail, which the tenacity of wood-fibre renders nearly impracticable in one of any size. The dovetail is extensively used in all cabinet-making, and may be seen in any mahogany or deal-box better made than a common packing-case.

When two beams of equal thickness are required to cross one another and to lie in the same plane, they are *halved* together; that is, a notch is cut in each of half the thick-



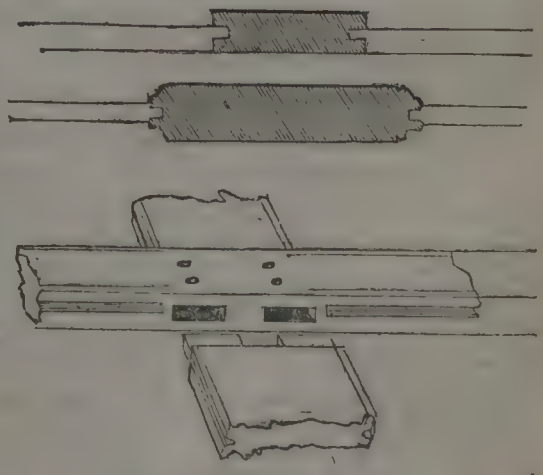
ness of the other, then the uncut part of each lies in the notch of the other respectively, and the two are pinned together

The smaller and better kind of work executed by the Carpenter is called *Joiner's work*, such as the making of doors, windows, stairs, wainscotting, boxes, tables, &c., &c., which are usually formed of yellow or Norway deals, wainscot, or else mahogany.

When a large surface is to be of wood, it is not formed of planks fixed together side by side till the requisite width is attained, but it is formed of *framing* and *pannelling*. A frame-work, of the area required to be covered, is formed of narrow planks, with cross-bars between to strengthen the frame; these are called *stiles* and *rails*, according to the directions in which they run, the former name being given to the upright planks of the frame, while the horizontal ones are called rails.

The rails are mortised into the stiles, and the tenons, since they must be comparitively thin, are made proportionably wide, nearly as wide as the rail. The tenons are always pinned into the mortise holes by one or two wooden pins driven quite through the stiles and through the inclosed tenon.

The edges of the stiles and rails are *ploughed*, that is, a rectangular furrow is cut in the edge by means of a plane, to receive the ends and sides of the *panels*. These panels are formed of thinner deals than the stiles and rails, and are made by glueing the edges of two or more boards together to make the proper width of the panel, the ends and edges of the panel are thinned off to fit into the groove or furrow in the stiles and rails, or else the ends and sides of the panel are *rebated*, that is, worked by a plane into the form shown in the annexed figure, the projecting part being received into the furrow.



As the panels are thinner than the frame, the former constitute so many recesses, at least on one side of the framing; and a small moulding is glued round the edge of the panel to form a finish to the work. Or else the same object is attained by working the edge of the stiles and rails with such a moulding, so that when the panel is put in, the moulding may finish against it. Sometimes the face of the panel is made to lie in the same plane with the face of the stiles and rails, and the panel is then said to be *flush*, and the edges of the stiles, &c., are finished with a small bead, also flush with the panel when finished.

In joiner's-work the whole surface of the work is made perfectly smooth by *planing* the material, and allowance must be made for the reduction in thickness and width of the wood, produced by this planing, in the choice of the rough material.

All mouldings in wood are worked out by planes made of the proper form, to leave the moulding in the wood when the plane has been passed over the part. The carpenter and joiner consequently require a vast variety of planes for these purposes, which constitute the most expensive part of the expensive tools used by these workmen. These planes receive their names from the form they are intended to produce in the wood, such as *rebating* planes, O G planes, ovolo-planes, beading-planes, and so on.

NATURE has perfections in order to show that she is the image of God, and defects in order to show that she is only his image.—PASCAL.

THE ANCIENT OFFICE OF PURVEYOR TO THE KING.

The office of Purveyor to the royal household, at the present day, is very different in its character from that which was formerly exercised under the same name. The Purveyor of modern times is nothing more than a tradesman who serves the king precisely as he would serve any other customer, and generally at as cheap a rate; the Purveyor of ancient days was an officer employed to enforce a very obnoxious prerogative, and for that purpose armed with a large share of power, which he generally contrived to abuse to his own profit and the great oppression of his fellow-subjects.

The "profitable prerogative of purveyance and pre-emption," as Blackstone calls it, was a right enjoyed by the crown of buying up provisions and other necessaries by the intervention of the king's Purveyors for the use of the royal household, at an appraised valuation, in preference to all others, and even without consent of the owner; and also of forcibly impressing the carriages and horses of the subject to do the king's business on the public roads in the conveyance of timber, baggage, and the like, however inconvenient to the proprietor, upon paying him a settled price. This prerogative prevailed pretty generally throughout Europe during the scarcity of gold and silver. In those early times the king's household was supported by specific venders of corn and other victuals, from the tenants of the respective demesnes

Many lands were from time to time granted to individuals, on condition of their yielding to the king certain supplies of provisions; the reservations, however, were often small, and many of them only to be rendered when the king travelled into the country where the lands lay. In some cases special care was taken that he should not make the service burdensome by paying his visits too often; as in the case of William, son of William Alesbury, who held lands in Alesbury, upon the tenure of finding amongst other things, three eels for the king when he should come to Alesbury in the winter, and two green geese in the summer; the number of visits, however, not to exceed three in the year.

There was also a continual market kept at the palace-gate to furnish viands for the royal use. This was superintended by an officer called "Clerk of the Market of the King's House," who was to burn all false weights and measures, to precede the king in his progresses, and warn the people to bake and brew and make provision against his coming, and by the oaths of twelve men to set the prices of provisions, beyond which no persons attending the court were to pay.

These arrangements answered all necessary purposes in those times, so long as the king's court continued in any certain place. But when it removed from one part of the kingdom to another, (as was formerly very frequently done,) it was found necessary to send Purveyors beforehand, to get together a sufficient quantity of provisions and other necessaries for the household: and lest the unusual demand should raise them to an exorbitant price, the powers above mentioned were vested in these Purveyors, "who in process of time greatly abused their authority, and became a great oppression to the subject, though of little advantage to the crown."

The king's butler had a right to choose for the king two hogsheads of wine out of every merchant's ship laden with wine, one in the prow, the other in the poop, paying to the merchants only twenty shillings each; he might take more if he would at a price to be fixed by the king's appraisers. Purveyance, however, was to be made between sun and sun, and nothing was to be taken in the highway. Hides, leather, and other necessaries were taken for making the king's saddles; beans and pease for his horses. Lord Coke says, that meat and drink could be taken by the king, only when in his progress, and that in his standing-house he could not take beer, ale, or bread, being manufactured; but malt, having the substance of barley remaining, might be taken.

In the reign of John, the abuses of purveyance had risen to such a height that they were made the subject of three articles of Magna Charta, which the barons obtained from that monarch at Runnymede. By the first, the constable or bailiff of a castle was restrained from taking corn or other chattels of any man not of the town where the castle was, without making immediate payment, unless the seller agreed to wait; but if the seller was of the town, three weeks were allowed for payment by the first confirmation of this charter in the beginning of the reign of Henry the Third. By the 30th article of John's charter, no sheriff or bailiff of the king, or any other, was to take any man's horses or carriages but by his consent; the subsequent charters add, "but at the old prices limited, namely, a carriage with two horses tenpence a day, with three horses fourteenpence a day." The 31st chapter of John's charter prohibited the taking of any man's wood for the king's castles or other necessaries, without the owner's consent; and this was confirmed by the subsequent charters. It appears, nevertheless, that the practice of taking the wood continued, and that money was extorted from the owners by demanding such as grew about the mansion-house and could ill be spared.

It appears by the statute of Westminster, passed in the third year of Edward the First, that Purveyors used to enter houses under colour of buying for the king, break the doors, locks, and windows, and thrash out and carry away the corn, and that they paid no more regard to the houses of prelates than to those of the laity. Edward the Second, in his sixteenth year, sent his writ to the justices of the King's Bench, commanding them to punish the infringers of the statutes upon this subject; but the steward of his household continued to exercise his power of purveyance with a high hand even in the city of London, notwithstanding the great privileges of that place; for in the eighteenth year of Edward's reign, he commanded that no fishmonger, on pain of imprisonment, should go out of the city to forestall any sea or fresh fish, or send them to any great lord or religious house, until the king's Purveyors should have made their purveyance for the king.

In the fourth of Edward the Third, an act reciting that the king, queen, and their children, oppressed the people by not paying for corn, hay, and cattle, and other "vittailes" which they took, and by taking twenty-five quarters of corn for twenty, measuring by heap, and taking hay and litter at less than the value; directs accordingly that nothing be taken without consent of the owner, that corn be taken "by the strike as men use throughout the kingdom," and that the things be taken at their true value by constables and other good men of the vill who should not be enforced by menace or duress to assess any other price than their oath would allow.

No severity of law, however, could restrain the rapacity of these plunderers; and in the twentieth year of Edward the Third, several Purveyors were attainted and hanged for offending against the statutes. Yet in spite of this example, it was found necessary

five years afterwards to pass another act; from which we learn that one of the frauds practised by these "harpies," as Queen Elizabeth called them, "was the taking of sheep between Easter and St. John with their fleeces on, keeping them till shearing time and then taking the fleeces to their own use. A petition of the Commons in the 28th of Edward the Third, sets forth that the Purveyors of the king, those of the queen, and those of the prince, would come successively to the same house, which they complain of as too grievous. This petition, and an act of the same year, explains another oppression. Purveyors were ordered to pay by tallies; these they gave payable at such distant places, that, as the act says, people spent their value and double in going after the money.

In the 36th of Edward the Third, some very important regulations were made for correcting the abuses of purveyance. According to Sir Edward Coke, this act was passed in consequence of a Latin work addressed to the king, by Simon Islip, Archbishop of Canterbury, sharply inveighing against the intolerable abuses of Purveyors and purveyances, and earnestly pressing and advising him to make remedies for those insufferable oppressions and wrongs offered to his subjects. It, however, was doubtless in a great measure the effect of a very strong petition of the Commons.

A very curious illustration of the abuses of purveyance, and the unblushing impudence of Purveyors in the reign of Edward the Sixth, is afforded to us in an account of the behaviour of one William Pallet, deputed Purveyor for the King's Majesty's provision of poultry, &c., in the town of Cambridge. It appears that Mr. Pallet exercised his powers so harshly as to excite a disturbance among the people of the town, and to render necessary the Vice-Chancellor's interference to pacify them. Instead of taking the provisions at prices fixed in the manner required by the statutes, he took everything at his own price; and what was worse, he took the liberty of purveying for his friends as well as for the King's Majesty, very candidly confessing that if he could not do the one he would not do the other. The bold air of effrontery which this man put on, when detected, shows pretty clearly how secure he must have felt of being supported by the court, which in those days was seldom disposed to permit any interference with the prerogative even when abused. When it was proved before his face that he had taken a pheasant and other birds in the king's name, and then sold them to different persons, he answered that he had done so to gratify some friends, and openly affirmed with an oath, that unless he might do his friend's pleasure in the execution of his office, he would not serve the king in it.

The Vice-Chancellor's reasonable request, that he would use his commission discreetly, and that when he had full passage in all the surrounding country, he would spare the market of the town, except he saw a pheasant or anything else fit for the king's table, was treated by Mr. Pallet in the most unceremonious manner; for he contemptuously cast his commission to the Vice-Chancellor and commanded him to go and serve it himself. He then sent up a false certificate to his master, accusing the Vice-Chancellor of having said that he should be sued before the king and not suffered within the market. When his master's son was sent down purposely from the court to inquire into this alleged ill-treatment of a royal Purveyor by the officers of the university, Pallet was unable to substantiate his charge; but his effrontery did not desert him, for while he was before the Vice-Chancellor and his assistants, he boldly commanded a justice of the peace of the university to go and provide him his horse for his carriage, although he knew the mayor's officers to be always ready to satisfy his wants in that respect. The next manœuvre of this unscrupulous rogue was to cease sending up his provisions for a whole day, in order to bring the officers of the university into displeasure by causing it to be supposed that they had stopped him, when in fact he was all the day bragging at taverns and alehouses in the town, and threatening that he would shortly cause some officers and justices of the university to be set in the marshalsea. After this example of the treatment which so powerful and privileged as the university experienced at the hands of a royal Purveyor, under such a monarch as Edward the Sixth, the reader may form some estimate of the hardships which the "kinges pore subjects" in general must have endured from the same quarter.

In the beginning of the reign of Queen Elizabeth, some of the counties, to avoid the trouble which they had in procuring their money for goods taken by the Purveyors, and which arose, in a great measure, from the many offices, cheques, entries, and comptrolments through which the accounts were to pass, petitioned her to accept the value in money to be yearly paid by the counties. Philips says that she would not hearken to this, but did afterwards come to an agreement, fixing the proportions which several counties should yearly afford in oxen, calves, muttons, poultry, corn, &c.; and that this agreement continues in force during her reign and that of her successor, James the First. In regulating these proportions, the principal burden was imposed on the counties adjacent to the metropolis, they deriving the most benefit from the royal residence; and Philips says that they could well afford to bear it, as their rents in the time of Charles the First were improved to twenty times more than they were in the reign of Henry the Seventh, and ten times more than they were in the eighteenth year of Elizabeth's reign.

But though Elizabeth would not grant the request of the counties that she would accept money instead of provisions, she hanged one of her Purveyors in her thirty-second year for forcibly taking provisions without paying for them. Prosecutions were also carried on in the star-chamber against some of her Purveyors; but she ordered Sir Thomas Egerton, the Lord Keeper, to stop the proceedings, as being an encroachment on the prerogative royal in her household, and commanded that the matter should be heard before the Lord Buckhurst, Lord Treasurer; the Earl of Nottingham, Lord High Admiral; Sir John Fortescue, Chancellor of the Exchequer, (being the commissioners for household causes,) Sir William Knollys, Comptroller of the Household, and the rest of the officers of the Board of Green Cloth, in the Compting-house; and the cause was heard there accordingly.

In Elizabeth's time, too, great complaints were made by the city of London, that the Purveyors took the first carts they could find, and frightened away those persons from the country that used to bring provisions; whereupon, a regulation was made that the carts in London and resorting to it should serve the Queen four times in a year, and the management of the matter was entrusted to the governors of Christ's Hospital.

When Elizabeth was at Nonsuch, in Surrey, her Purveyor of coals used to make out a warrant to the high constables of some Rape in Sussex, to warn carts for the carriage of coals to Nonsuch, appointing a meeting with them to receive the returns on

the warrants. Sometimes the carts went to the places appointed but found no coals to carry; in general, however, it was well understood that the principal object was the preliminary meeting, at which the Purveyor would assign the parties over to a person whom he took with him, to compound for their carriages. This man would take twelve shillings for every load; and he at last raised the sum to fourteen shillings. The justices of Sussex complained of this to the Board of Green Cloth in 1598.

In 1604, soon after the accession of James the First, the Commons determined on a representation to the king of the grievances occasioned by the Purveyors; and Sir Francis Bacon made a long speech on the subject to the king, in the withdrawing chamber at Whitehall.

There was no grievance, (he told the king,) in his kingdom so general, so continual, so sensible, and so bitter to the common subject as that which he was then speaking of. They did not pretend to derogate from his prerogative nor to question any of his regalities or rights; they only sought a reformation of abuses, and a restoration of the laws to which they were born. He complains that the Purveyors take in kind what they ought not to take; they take in quantity a far greater portion than cometh to the king's use, and they take in an unlawful manner. They extort money in gross or in annual stipends, to be freed from their oppression. They take trees, which by the law they cannot do; timber trees which are the beauty, countenance, and shelter of men's houses; that are a loss which men cannot repair or recover. If a gentleman is too hard for them whilst at home, they will watch him out and cut the tree before he can stop it. When a poor man hath his goods taken from him at an under value, and cometh to receive his money, he shall have twelvepence in the pound deducted; nay, they take double poundage, once when the debenture is made, and again when the money is paid.

He tells the king also, that "there is no pound of profit to him, but begetteth three pound damages on the subject, besides the discontent." By law, the Purveyors ought to take as they could agree with the subject; by abuse they took at an enforced price.

By law they ought to make but one apprisement by neighbours in the country; by use they make a second apprizement at the court-gate; and when the subjects' cattle come up many miles, lean and out of plight by reason of great travel, they prize them anew at an abated price. By law they ought to take between sun and sun; by abuse they take by twilight and in the night. By law they ought not to take in the highway, by abuse they take in the ways. This abuse of purveyance, if it be not the most heinous abuse, yet it is the most common and general abuse of all others in the kingdom.

We have other testimony to the abuses arising from purveyance at this period, in the curious confession made by one Richards, when he was examined before the Star-chamber, of the rogueries practised by him and his brethren. He said that they charged ten times the quantity wanted, sold the surplus, and shared the money. They went to the most remote places to make their purveyance, in order to induce the people to come to a composition. They conspired with the high-constables to charge more than enough, and took half the money of them, but gave receipts for the whole, the constables taking the rest. The clerk of the market set the prices below the value and shared the gain. This confession did not, however, save the culprit, who had likewise extorted money under pretence of having a grant for compounding fines on penal statutes, and he was sentenced to stand in the pillory in Westminster, in Cheapside, in three market towns of Dorsetshire, and in three of Somersetshire,—to lose one ear at Dorchester, the other at Wells,—to ride on a horse with his face to the tail, and papers pinned on him, expressing his crime,—to pay a fine of one hundred pounds,—and to be imprisoned during the king's pleasure.

In the reign of Charles the First, a dispute arose concerning the right which that monarch claimed of digging anywhere for saltpetre, in order to provide gunpowder for his troops. The judges allowed the claim; they held that the king could not "prescribe" for the right, because the art of making gunpowder was brought into England within memory, viz. in the time of Richard the Second, yet, as the same concerned the defence of the realm, the king might take sufficient for that purpose in the nature of purveyance.

During the Commonwealth the powers of purveyance fell into disuse; and, in 1661, after the Restoration, the grievance was wholly abolished by the 12th of Charles II., the Parliament at the same time granting to the king, in satisfaction of the interest which he conceded, a certain tax upon beer. In the following year, however, the statute was temporarily relaxed in favour of the king's royal progresses, by an act empowering the clerk, or chief officer of His Majesty's carriages, by warrant from the Green Cloth, to provide carts, &c. for His Majesty's use, and persons refusing to serve were made liable to a penalty. Philips says that it was the want of the ancient purveyance which prevented Charles the Second from making a progress which he had designed into the country in the Summer of 1661.

We shall conclude in the words of Mr. Bray, from whose paper on this subject, in the *Archæologia*, we have derived most of our information.

Thus have we taken some view of the rise, progress, and extinction of an office which subsisted for ages, without producing to the crown a return at all adequate to the burdens it imposed on the subject. We see Archbishop Islip's words fulfilled; the abolition of purveyance has not occasioned any want of provisions in the king's house, and instead of his people flying from his approach, they fly to meet and welcome him whenever he visits the country.

A WARNING VOICE IN LONDON.

In London town wags many a tongue,
And nonsense much is spoken;
In London many a lie is told,
And many a promise broken.

But there's a tongue in London town
Whose voice is grave and true;
Ancient as Time the tale it tells,
And yet 'tis always new.

Solemn and loud above the crowd
It booms both night and day;
You hear it when you're close at hand;
You hear it, miles away.

Measured and grave the note it sounds
O'er Middlesex and Surry;
It lingers not for lagging souls,
Nor hastes for those who hurry.

By day while all the world's agog,
Amid the city's humming,
"Mortals," it cries, "Time flies apace,
Eternity is coming!"

By night while wearied folks repose,
Unwearied still and waking,
That solemn warning it repeats
The night's dread stillness breaking.

St. Paul's! Thou hast an awful voice,
But may I never fear it;
Ev'n when thou toll'st my dying hour
May I rejoice to hear it.—D. D. S.

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THE RHINE. No. VI.

JOHANNESBERG CASTLE.

JOHANNESBERG, AND THE WINES OF THE RHINE.

Come with me, your faithful friend,
On the wings of thought along,
To where the Rhine his course does bend
Rich vine-covered hills among;
To his mountains tempest-braving,
Isles with gayest verdure clad,
Fields with yellow harvest waving,
And his woodlands wide outspread.

In former papers, we have taken occasion, in describing portions of the scenery of the Rhine, to speak of the vines which are so largely cultivated upon its banks, and to which the fancy of those who have never seen them assigns a larger share in the formation of its picturesque attractions than they are entitled to. In the minds of most persons the Rhine and the vine are inseparably associated; indeed, the appellation of "Father of Wine," which the Germans have fondly bestowed upon this magnificent river, bespeaks as close a connexion between the two things, as the rhymes of poets have established between the two names.

The wines of the Rhine are chiefly produced along that part of its course which lies between Mentz and Coblentz, and throughout which the river is for the most part confined on both sides by lofty banks, whose light porous soil and rocky substrata furnish the most favourable sites for the cultivation of the grape. The choicest produce is, however, limited, not only to a particular part of this course, but also to one side of it; namely, that fertile and beautiful district of Nassau, which stretches from the Taunus hills to the northern or right bank of the river, and is known by the name of the Rheingau*.

Among the wines of the Rheingau, the first place is, by common consent, yielded to those which are produced on the far-famed domain of Johannesberg.

This golden hill, (says the Baron von Gerning,) is the crown of the Rheingau, in the midst of which it is most picturesquely enthroned. In its vicinity, we feel ourselves in the very heart of the far-famed Rhine-land. We ascend imperceptibly this detached vine-hill, which is protected towards the north-east by the wood-covered Rabenkopf, and towards the north by the Taunus mountains. Behind the priory on the same hill, lies the town or village of Johannesberg, formerly a colony of servants belonging to the establishment; and at the foot of the hill facing the river, lies the little village of Johannesgrund, and also a nunnery called the Klause, connected with the abbey by a subterraneous passage, which was founded in 1109 by Richolf, the last Rhinegrave, in honour of St. George, the then patron of the crusaders. The top of the castle commands a most beautiful view of the Rhine, from Biebrich to Bingen, over the nine islands and the twenty intervening cantons. Slender elms adorn the foot of the golden hill, which was an allodial possession belonging to the archbishopric of Mentz, before the Rheingau came into that see, and before it received the name of Bischoffsberg.

According to the general account, Rhabanus Maurus, previously Abbot of Fulda, first planted this vine-hill, and built a chapel here, dedicated to St. Nicholas; it is also said that he was here elected Archbishop of Mentz in 847. This account, however, rests upon scarcely sufficient authority; it is a fact

* See *Saturday Magazine*, Vol. XII., p. 105.

better established, that, in the year 1106, Ruthard, Archbishop of Mentz, founded a Benedictine convent upon this hill, and dedicated it to St. John; the convent became enriched with additional endowments until about 1130, under the archbishop Adelbert, it was transformed into a Benedictine abbey.

During the turbulent times of the middle ages, this abbey suffered severely from the calamitous wars to which the country around was constantly exposed; and even in the page of modern history its misfortunes have been recorded. In 1525, during the war of the Boors, it was greatly injured; and seven-and-twenty years afterwards, it was plundered and burnt down by the markgrave, Albert of Brandenburg. It was afterwards restored, but again in 1631 was destroyed by the Swedes, whose dreadful ravages in Germany are still to be traced at the present day. In consequence of these various misfortunes, the establishment became involved in debt, and was abandoned after having been mortgaged for twenty thousand rix-dollars by the archbishop, Elector of Mentz, Anselm Casimir, to Hubert von Bleymaun, treasurer of the empire. The Benedictines soon became very anxious to regain their old possession; but in the mean while the mortgage had risen to thirty thousand rix-dollars, which it surpassed their ability to produce. Fortunately, however, they found a powerful supporter in the Prince Bishop and Abbot of Fulda, who was of the same spiritual fraternity with the monks of Johannesberg; that dignitary, after a dexterous negotiation at Mentz, succeeded, in 1616, in recovering their abbey on payment of the mortgage and an additional sum. Instead, however, of being restored to its conventual state, it was converted into a priory.

About the same time, the modern castle or palace was built by the prince bishop; and two of the ecclesiastics belonging to Fulda constantly resided here. Portraits of five bishops are to be seen in one of the apartments; from which also a view is obtained of the mountains of Fulda. Underneath is a cellar, which is said still to exhibit the traces of an attempt made by the French to blow up the edifice in 1796, on account of arrears of contribution,—"An attempt" says Von Gerning, "which would have been realized but for the vigorous interference of the honest bailiff of Rüdesheim, who, on this occasion, spoke his mind in bold German to the plundering general of the hostile forces." Among other things the bailiff said, "On beholding these ruins the passing traveller will exclaim with execration, 'This was done by that general.'" The French had emptied the cellars of their wine in the year 1792, when they crossed the Rhine as the bestowers of freedom.

Johannesberg remained in the hands of Fulda until 1802; for three years longer it was possessed by Orange Fulda; and then, in 1805, it passed into the possession of the French, who kept it till the end of the war which liberated Western Germany in 1813.

It was at length, (says Von Gerning,) taken possession of by Austria in 1815; and on the 1st of August, 1816, one hundred years after it came into the hands of Fulda, Prince Metternich, the Oxenstiern of our day, received it as a fief, burdened with an annual duty of the tenth part of the wine produced, by way of reward for his patriotic services

The situation of Johannesberg is remarkably fine; it has a delightful southern aspect, and commands an extensive and charming view over a fertile and varied tract of country. The hill contains about sixty acres of vineyard; and attached to it are seventy acres of meadow, four hundred and fifty acres of arable land, and four hundred of forest land, the sovereignty of which belongs to Nassau. The vines consist mostly of *riesslinge*, which impart the particular flavour that characterizes this "German Tokay;" they are small round grapes, sweet and savoury, and of a whitish-yellow colour. The wine itself is described as being "of a gentle heat, mild and strong at the same time, and uniting all the good qualities of the juice of the grape, which are heightened by a late vintage, that generally takes place in the beginning of November, after the grapes have been completely ripened by the frost."

The *riesslinge* is the plant generally cultivated in the Rhinegau; it requires a warm exposure. In some places an Orleans grape is grown, and produces a wine which is much esteemed for its peculiar flavour and aroma. The vintage is performed in the most careful manner, and at as late a period as the climate and season will permit. For the white wines, which constitute by far the greatest proportion of those made in Germany, the grapes are separated from the stalks and fermented in casks, by which means the aroma is fully preserved. The wine is freed from the lees by successive rackings, and when sufficiently clarified, is introduced into tuns where it is allowed to mellow, and continues to improve during a long term of years. Those used in the Rhinegau commonly hold eight *ohms*, or three hundred and twenty-eight gallons; but in other parts of Germany they are of larger capacity. Formerly the great proprietors vied with each other in the magnitude of the vessels in which they collected and preserved the produce of their vines: and as the better growths are valued in proportion to their age, the stock of wines in the cellars belonging to the princes, magistrates, and richer order of monks, was often enormous. Most persons have heard of the Heidelberg tun*, and other immense casks in which they have been kept for whole centuries.

At the beginning of this century, (says a native writer,) Germany saw three empty wine casks, from the construction of which no great honour could redound to our country among foreigners. The first is that of Tübingen, the second that of Heidelberg, and the third at Grüningen, near Halberstadt; and their dimensions are not greatly different: the Tübingen cask is in length twenty-four, in depth sixteen feet; that of Heidelberg thirty-one feet in length and twenty-one deep; and that of Grüningen thirty feet long and eighteen deep. These enormous vessels were sufficient to create in foreigners a suspicion of our degeneracy; but to complete the disgrace of Germany, in the year 1725 a fourth was made at Königstein larger than any of the former.

Dr. Henderson remarks, however, that such a mode of preserving certain vintages is not so absurd as some writers have imagined; for the stronger wines are undoubtedly improved by it to a greater degree, than they could have been by an opposite system of management. But in practising this method, it is essential in the first place to keep the vessel always full; and secondly, when any portion of the contents is drawn off, to replace it with wine of the same growth, or as nearly resembling it as possible. When such cannot be had, the vacant space may be filled up by introducing washed pebbles into the cask. The wine which Keysler drank, from a tun which bore the date of 1472, had become thick and acid, because these precautions were neglected. Had it been kept in bottle, this degeneration probably would not have taken place. For the more delicate growths, however, it is said that small vessels are certainly preferable.

The wines of the Rhine, (says Dr. Henderson,) may be regarded as constituting a distinct order by themselves. Some of the lighter sorts, indeed, resemble very much the

* See *Saturday Magazine*, Vol. III., p. 140.

*vins de graves**; but in general they are drier than the French white wines, and are characterized by a delicate flavour and aroma, called in the country *gäre*, which is quite peculiar to them, and of which it would, therefore, be in vain to attempt the description. A notion prevails that they are naturally acid; and the inferior kinds no doubt are so: but this is not the constant character of the Rhine wines, which in good years have not any perceptible acidity to the taste,—at least not more than is common to them with the growths of warmer regions. But their chief distinction is their extreme durability, in which they are not surpassed by any species of wine.

The Rhine wines often possess the valuable quality of durability when they have little else to recommend them. As they are capable of almost indefinite duration, and as their flavour and aroma are always improved by long keeping, it becomes of essential importance to determine the respective characters of the different vintages for a more extended period than is necessary in the case of most other wines. In favourable seasons the growths of the Rhine are free from acidity, but in bad seasons they contain an excess of what is called malic acid, and are, consequently, liable to the imperfections attendant upon the presence of that ingredient; and as the moisture of a northern Autumn often obliges the grower to gather his grapes before they have attained their full maturity, it is evident that a large proportion of the vintages must be of this description. Hence the wines which have been made in warm and dry years, such as that of 1811, or the year of the comet as it is sometimes called, are always in great demand, and fetch exorbitant prices. Of preceding vintages, those of 1802, 1800, 1783, 1779, 1766, 1748, and 1726, are reckoned among the best, and among them that of 1783 is the most highly esteemed.

Of the Johannesberg wine, the choicest produce is that called Schoss-Johannesberger, which is indebted for its celebrity to its high flavour, and the almost total absence of acidity from it. In former days, when the domain was the property of the Bishop of Fulda, this precious wine was very rare, and it was only by favour that a few bottles of the prime vintages could be obtained from his lordship's cellars. During the changes which occurred in the early part of the present century, a considerable quantity of the wine found its way into the market. A portion of that which grows at the foot of the hill is always to be had; even this is said to be preferable in point of flavour to most of the other Rhine wines, and bears a high price.

Next to the Johannesberger may be ranked the produce of the Steinberg vineyard, which belonged to the suppressed monastery of Eberbach, and is now the property of the Duke of Nassau. It is the strongest of all the Rhine wines, and in favourable years has much sweetness and delicacy of flavour; the vintage of 1811 has been sold on the spot at as high a price as five florins and a half, or half-a-guinea the bottle. The whole quantity made is about 300 hogsheads, of which 60 are of first-rate quality. Some persons, however, dispute the claim of the Steinberg to rank second among the wines of the Rheingau, placing before it the Rüdesheimer wine, which grows on a hill opposite to Bingen, whose acclivity is so steep, that its face has been, to a great extent, formed into terraces, to which the requisite quantity of vegetable mould and manure is carried up in baskets. The Orleans grape is that chiefly cultivated, yielding a wine which combines a high flavour with much body, and is freer from acidity than most of the other growths of the Rhine. This is partly attributed to the favourable exposure, which allows the grapes to ripen fully, and also to the lateness of the vintage, which seldom commences till the end of October or the beginning of November.

The vineyard of Grafenberg, which formerly belonged, as well as the Steinberg, to the wealthy convent of Eberbach, but is of much less extent than that, is still distinguished for the choiceness of its growths. The produce of Markebrunne, in the same neighbourhood, and that of Rothenberg, near Geisenheim, are highly prized for softness and delicacy of flavour. All these wines are white. The only red wine worthy of notice among the wines of the Rhinegau is grown at Asmanshausen, a little below Rüdesheim; in good years it is scarcely inferior to some of the better sorts of Burgundy; but the quantity produced is small, and inferior wines are often substituted under its name. The grapes from which it is made are small, and of a blue colour; Charlemagne is said to have brought the first vines bearing it from Burgundy.

In speaking of the Rhine wines, it is necessary to mention those of Hochheim, which, though obtained from vineyards lying on the banks of the Maine, are usually classed with the Rhine wines, as being of like nature, and nearly of the same excellence. Indeed all the best sorts of the Rhine wines have long been confounded in our country under the general name of Hock, and Rhenish has become the distinguishing term of disrepute for inferior growths. "The Hochheimer," says Dr. Henderson, "is, strictly speaking, a Maine wine; but a corruption of its name has long furnished the appellation by which the first growths of the Rhine are ususally designated in this country." *Hock* is a contraction of Hockamore, which again is evidently an English corruption of Hochheimer.

The little town (says the Author of *An Autumn near the Rhine*), is surrounded by vineyards, with scarcely a tree to obstruct a single ray of sun; but the choice wine of the place, which every alderman flatters himself he drinks, is produced on a little hill of about eight acres, behind the ancient deanery, which seems formed to court the sun, and is protected by the town from the north winds. Each acre contains about 4000 vine-plants, valued at a ducat each; and the little hill produces, in a good year, about twelve large casks of wine, each of which sometimes sells for 1500 florins. (nearly 150*l.*) Hochheim was presented by Buonaparte to General Kellerman.

According to Dr. Henderson there are two vineyards at Hochheim, which yield the first-rate wine; they were both in former times the property of the deans of Mentz. Their united extent does not exceed twenty-five or thirty acres; but the surrounding lands yield an abundant produce, which, as in the case of other wines, often passes for the first-rate. The soils are composed of a white or brown marle, mixed with fine gravel, and reposing in some places on strata of coal, which in hot and dry seasons is said to impart a particular flavour to the wine.

Some of the Rhine wines fetch exorbitant prices, especially those of celebrated vintages. The Baron von Gerning says, that a cask of Johannesberg wine, containing eight *ohms*, or 328 gallons, particularly of the vintage of the "comet year," 1811, often sells for from 3000 to 4000 florins, or from 333*l.* to 444*l.* sterling, which is at the medium rate of nearly 24*s.* per gallon. Among the prices of some of the principal Rhine wines, quoted by Dr. Henderson, are some reaching the amount of 38*s.*, and upwards of 2*l.* per gallon; there are some even running as high as 18*s.* the bottle.

Dr. Henderson observes, that the same causes which have led to the degeneracy of some of the most celebrated French wines, have operated equally on those of the Rhine. The health of the vine, and

* The *graves* are wines grown upon the gravelly lands to the south-east and south-west of Bordeaux; they are so called from the nature of the soil.

the quality of its fruit, are liable to be affected by a variety of delicate circumstances; a single year of slovenly culture, an injudicious mode of pruning, or the substitution of new plants for old, may ruin the reputation of a vineyard for ever.

For a long time the choicest growths, not only in France but in other countries, were raised on lands belonging to the church; the *vinum theologicum* was justly held to be superior to all other wines. The rich chapters and monasteries were always more studious of the quality than of the quantity of their vintages; their grounds were tilled with the greatest care, and their vines were managed in the most judicious manner; nor did they reject a plant that bore but sparingly, provided there was no falling off in the goodness of the liquor which it supplied. Moreover, in the middle ages, it is well known that the clergy were almost the sole depositaries of learning; and the continued opportunities of observation and study which their retired pursuits afforded them, had probably brought them acquainted, at a very early period, with the best methods of directing the fermentation of the grape and meliorating the produce. When the domains passed into the hands of laymen, the same assiduity and skill were seldom shown in the culture of the vines, or treatment of the vintage; and, in many instances, the old plants, which yielded the most valued wines, were rooted out to make room for others that gave a more abundant supply, but of inferior character.

There is, however, another circumstance to be urged in explanation of the fact, that the choicest wines, in the middle ages, were raised on lands belonging to the church.

The monks (observes a writer in the *Quarterly Review*,) were not only, as depositaries of all the learning of the times, themselves most skilled in the culture of the vine, and the manufacture of its juice; but they were also, in every respect, the best landlords, and maintained the happiest dependants. Respect for the church generally saved their land from devastation in feudal broils; there was more security in their cultivation, and they would naturally communicate some of the results of study and experience in rural economy to their vassals.

At no time, however, can the cultivation of the vine on the banks of the Rhine have been attended with much gain and happiness to the labourer. It is true that some countries support a numerous population, but the poverty and misery of the peasantry in them has been long proverbial. Nearly half a century ago, Dr. Cogan spoke of the axiom, "that poverty is most prevalent where the vine is most cultivated," as being well founded. He said that numerous vineyards, such as those on the banks of the Rhine, notwithstanding the picturesque scenes which they presented to the eye, or "the pleasant ideas of luxurious conviviality" which they excited, were, by no means the primary blessings of a country.

Bacchus, whatever, joviality he may occasion, has not the benevolence of Ceres; although, by exhilarating the spirits, he may for a season conceal the distress he occasions. Wine is a luxury which cannot furnish either food or raiment to the peasant, and the real necessaries of life are always the dearest where this superfluity becomes the chief article of attention and of commerce; they are purchased as *foreign* commodities, and consequently at an advanced price.

It is not the business of virtue to extirpate the affections of the mind, but to regulate them. It may moderate and restrain, but was not designed to banish gladness from the heart of man. Religion contracts the circle of our pleasures, but leaves it wide enough for her votaries to expatiate in. The contemplation of the Divine Being, and the exercise of virtue, are in their own nature so far from excluding all gladness of heart, that they are perpetual sources of it. In a word, the true spirit of religion cheers as well as composes the soul: it banishes indeed all levity of behaviour, all vicious and dissolute mirth, but in exchange, fills the mind with a perpetual serenity, uninterrupted cheerfulness, and an habitual inclination to please others, as well as to be pleased in itself.—Addison.

THE WOOLLEN MANUFACTURE.

No. III.

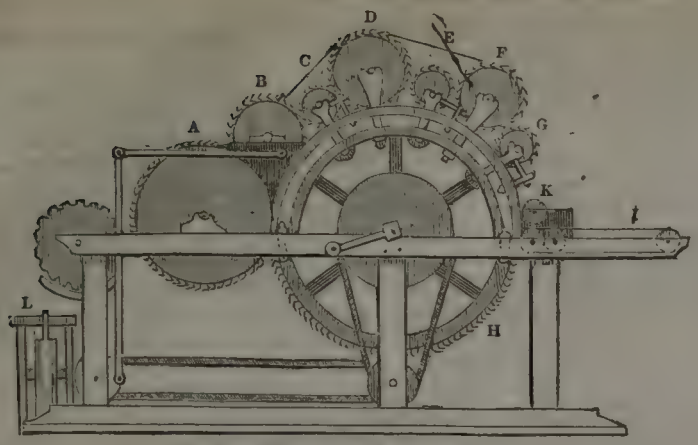
The Manufacture of Short or Cloth Wool.

The first operation to which the short wool is subjected when received by the manufacturer, is that of opening or disentangling its fibres; for this purpose a machine called a *wool-mill*, *willy*, or *willow*, is employed. It may be described as a cylindrical or conical drum, about three feet long, and two and a half in diameter, thickly covered with sharp pointed teeth, or spikes. This cylinder works upon a strong axis, and is enclosed in a wooden frame or box, two ends of which can be opened, being fixed on hinges; the bottom of the box is not solid, but formed of slips of wood with intervals between them, to allow any dust which may be disengaged in the process to fall through. Over the cylinder, its axis being horizontal, are five smaller rollers or cylinders, also furnished with teeth, and turning on their own axes. The teeth of the rollers and those of the drum, intersect each other during the rotation, as do also the teeth of the rollers themselves. The front door being turned down on its hinges, a quantity of raw wool is laid on it; the door is then closed, and the wool by that means brought within reach of the teeth of the large drum, which carries it upwards so as to work it between its own teeth and those of the smaller cylinders; as the motion is very rapid, the fibres of wool are separated and pulled about in all directions. After being submitted for a certain time to these operations, the door on the other side of the case that encloses the drum is opened, and the wool thrown out by the centrifugal force of the cylinder. The front door is then opened, a fresh supply of wool is introduced and again thrown out, and so on. This process is repeated several times according to the nature of the wool, or the purpose for which it is designed; if the wool is dyed, it undergoes the same operation after the dying.

The *scribbling machine* is next employed; this, in principle and construction resembles the last, but instead of the cylinders being covered with strong teeth like spikes, their surfaces are furnished with *cards* like those used in the manufacture of cotton*; by means of this machine the fibres of the wool are more equally distributed, and the wool passes through this machine three times. It now is removed to the *carding-engine*.

The carding-engine consists of a number of smaller cylinders, A B C D E F G, covered with *card-cloth*, revolving round a larger cylinder H, covered in the same manner. The large cylinder is about thirty-six inches in diameter, and thirty-two inches in length. I is an endless apron on which the wool is spread equally by hand; this apron is carried slowly onwards towards the two feeding-rollers K, by which it is seized and conveyed to the small cylinder G; from this it is transferred to the large cylinder H. The three largest of the first six small cylinders are called *workers*, and the three smaller, *cleaners*; the wool, in the first instance applied to the large cylinder or drum, is taken off by the first worker, which is in its turn rubbed by the first cleaner, this last returns it to the drum; it is taken up again by the second worker, and again removed by the second cleaner, and so on, until it reaches the cylinder A, called the stripping-cylinder or *doffer*, which is much larger and turns slowly. The cards on the doffer do not entirely cover its surface, but are placed on in stripes, fig. 2. The wool falls off the doffer in fleeces about four inches in breadth, and twenty-seven or twenty-eight in length,

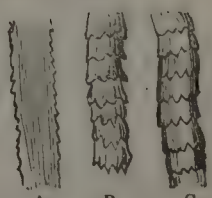
* See *Saturday Magazine*, Vol. V., p. 100.



THE WOOL-CARDING ENGINE.

Fig. 2

Fig. 3.



and is received in a cylindrical box L, in the centre of which a fluted cylinder revolves, which gives the fleeces a spiral form, the first element of the thread.

The next operation is performed by the *slubbing-billy*. It reduces the cardings by drawing them out in lengths, joins them in a continuous spongy cord, giving them at the same time a slight twist to prevent their breaking. The wool is now in the state of a soft thread, similar to a *roving* in the cotton manufacture, and is called a *slubbing*; it is now ready to be spun into a thread of a harder texture. The operation of slubbing and spinning in worsted so nearly agree with the same processes in the cotton manufacture, that it would be unnecessary again to enter upon the subject.

When the cloth first comes from the weaver, it is in a very rough unsightly state, and contains a quantity of oil, with which it has become combined during the several processes it has undergone. The next operation is *scouring*, which is performed in the fulling-mill, the cloth being soaked in an alkaline ley, and beaten by machinery; it is then well rinced with pure water and hung on the tenter-frames to dry. When dry, it is taken down and examined carefully, the knots picked out, and any rents or cuts it may have received, repaired by introducing fresh threads; this is called *burling*. The cloth has now to be thoroughly cleaned in the *fulling-mill*, by means of soap and water

The next process is *milling*, or *felting*. In the state in which the cloth is received from the *tenter-field*, the naked threads are very perceptible, and the operation of milling is to swell the threads, and *felt* them so as to allow of the cloth afterwards receiving that fine smooth and polished surface, which is the great beauty of fine cloth, and which renders it also more impervious to wet. Commonly, a piece of cloth of sixty-two yards, requires six pounds of soap, which is dissolved in water, and about a handful spread upon each yard in length; the piece is then put into a trough and worked for three hours in the fulling-mill. After twelve hours milling, the cloth is reduced in breadth about two-fifths, and in length one-third; it is now again strained on the tenter-frame, by which it is stretched about one-twentieth, or two yards in forty, but it is very little extended in breadth. The property of felting is only possessed by the short wool, and it is of so singular a nature, that it deserves particular notice.

If an ear of bearded corn is introduced between the wristband and the wrist, the stalk being placed towards the shoulder, the common motions of the arm will cause the ear of corn to move upwards until it reaches the shoulder, and this occurs whether the arm is thrust out of the sleeve or drawn back; this motion takes place by means of the jagged ends of the grains of corn. The thrusting of the arm outwards would naturally tend to thrust forwards the ear, but the sharp angles of the grain fixing themselves firmly into the shirt-sleeve, maintain the ear in its situation; if the arm is drawn in, the same cause enables the ear to catch hold of the skin and to be drawn upwards, and this is repeated every time the arm is drawn inwards or forced outwards.

Now the construction of the hair of the sheep and the ear of corn is somewhat similar, and the magnified view of three kinds of wool, fig. 3, will show the reason why one sort will felt and the other will not. The long English wool A, it will be seen, is much less notched on its surface than the Saxon B, or the original Spanish C, and therefore resembles less the ear of corn, and will not be acted on in the same manner. The fibres of the cloth made of short wool on being subjected to the operation of fulling, shrink considerably in their length, and close in, as it were, upon each other. The jagged ends of this wool now become entangled, and any attempt to stretch the cloth again to its original length and width would be useless; the more frequently this operation of fulling is repeated, the thicker the texture of the cloth becomes, and it is then said to be *double milled*. We know that if common woollen cloth, when made up into a garment, should get wet, it shrinks considerably, much to the annoyance of the wearer, who, in this manner, has it milled upon his own person. The felting of wool in the manufacture of hat bodies, is effected by acting on the same principles, but the process is more frequently repeated, so as to cause the fibres of the wool to be completely matted together.

After the milled cloth has been properly dried, it has to be *dressed*; this was formerly done by means of the seed-vessels of the fuller's teasle, formed into a kind of hand card, but latterly it has been effected by machinery, and in some cases by means of very fine wire cards. The dressing is the process by which the nap is raised.

The last operation the cloth has to undergo is called *shearing*, or *cropping*; the wool, by the operation of dressing, covers the surface of the cloth like loose fur, which must be removed before it is fit for the market; this was formerly effected by hand with a large pair of shears, but of late years this part of the manufacture has also been performed by the aid of machinery. The cutting instruments resemble the blades of the hand shears, one blade is fixed in an oblique direction, while a revolving cylinder is furnished with several moving blades, which act in succession against the fixed blade, in the same manner as if a pair of shears were worked by hand. The cloth itself is stretched over a metal bed to prevent its lying in creases. The list being thicker than the

rest of the fabric is left unsheared, the blades of the cutters not being of a sufficient width to cut the nap with which it is covered, and as the list is thicker than any other parts of the cloth, grooves are contrived for its reception, and to allow the shears to clip close.

Some of the common woollen cloths are hot-pressed to give them a face, and as this smoothness should only appear on one side, the other is made rough again by means of a sponge and water; this kind of cloth is also dyed after weaving, and the list is sewn on to give it the appearance of having been dyed *ingrain*.

ON EMPLOYMENTS WHICH INJURE THE EYE-SIGHT. No. IV.

EFFECTS OF THE EXPOSURE OF THE EYE TO ACRID FUMES.

(4.) We need not offer more than one illustration to this class, inasmuch as others will be readily suggested to the reader's own mind when we state that many fumes, vapours, gases, such as those afforded by ammonia, muriatic acid, &c., so affect the sentient apparatus of the eye as to cause a general irritability which the eye itself tends to remove by exciting a flow of tears. This power, however, is lost in time; inflammation comes as a prelude to disease of a permanent and more lasting character.

The case we have selected is a remarkable one, illustrating the noxious effects resulting from exposure of the person to acrid fumes. A class of persons employed in cleansing the immense sewers of the city of Paris are subject to a disease which is called in one case *la mitte*, in the other case *le plomb*. The former is caused by ammoniacal vapours, and is announced by a smarting in the eyes, and the eye-ball and pupil soon become red, accompanied with other pains, chiefly about the head. Blindness often results, which lasts for a day or two. The patients endure much pain, and get no relief until tears begin to flow. In slight attacks exposure to the open air and shading the eyes is a sufficient remedy: if the attack is strong the men are accustomed to wash their eyes in cold water, to tie a wet bandage over them, and to remain in the dark.

Le plomb is also due to gaseous exhalations, chiefly sulphuretted hydrogen and ammoniacal gases, producing convulsions and other alarming symptoms. The danger to these workmen is now entirely removed by the copious use of chlorine in combination with lime or soda, as chlorine possesses the valuable property of entirely destroying and neutralizing these effluviæ.

It is perhaps in this place that we may mention a train of effects resulting from narcotics taken inwardly. The effects produced do not certainly come under the denomination of fumes as ordinarily considered; but, be that as it may, the subject is one of much importance, and we do not wish to pass it over unnoticed.

Amaurosis is caused by the use of narcotic substances which have been supposed to act specifically in depressing the energy of the nervous system in general. The symptoms of amaurosis, however, by no means support the opinion that they have a direct sedative operation: the loss of sensibility, as well as the dilatation of the pupil, may be the effect of increased excitement, or a full state of the vessels; for besides considerable external turgescence, sensibility of the pupil almost invariably returns on having recourse to bleeding. The principal substances of this class are *opium* in large doses, *hyosciamus*, *stramonium*, and *bella donna*. The well-known effect which these substances possess of dilating the pupil when applied to the surface of the eye, or of the neighbouring parts, differs only in degree from what follows their being taken into the stomach; but instead of effecting a loss of power or paralysis of the iris, they seem rather to act as stimuli on the antagonist fibres which compose the greater ring of the iris, and thus overcome its normal or regular obedience to the stimulus of light, analogous to those involuntary and spasmodic actions which they occasion when taken internally. See Vetch on *Diseases of the Eye*, Christison also in his *Treatise on Poisons*, cites numerous interesting cases of the effect of narcotic poisons on the pupil of the eye.

LAVA. MOUNT VESUVIUS.

It was in the month of February (1793) that I went with a party to the source of the lava, for the first time, to ascertain the real state in which the lava proceeded from the volcano that created it. I found the crater in a very active state, throwing out vollies of immense stones, transparent with vitrification, and such showers of ashes involved in thick sulphurous clouds, as rendered any approach to it extremely dangerous. We ascended as near as possible, and then, crossing over to the lava, attempted to coast it up to its source. This we soon found was impossible, for an unfortunate wind blew all the smoke of the lava hot upon us, attended at the same time with such a thick mist of minute ashes from the crater, and such fumes of sulphur, that we were in danger of being suffocated. In this perplexity I proposed immediately crossing the current of liquid lava, to gain the windward side of it, but felt some fears, owing to the very liquid appearance the lava there had so near its source. All my companions were against the scheme, and while we stood deliberating, immense fragments of stone and huge volcanic bombs, that had been cast out by the crater, but which the smoke had prevented us from observing, fell thick about us, and rolled by us with a velocity that would have crushed any of us, had we been in their way. I found we must either leave our present spot, or expect instant death: therefore, covering my face with my hat, I rushed upon the lava, and crossed over safely to the other side, having my boots only a little burnt, and my hands scorched. Not one of my companions, however, would stir; nor could any persuasion of mine avail in getting a single guide over to me. I then saw clearly the whole of the scene, and expected my friends would every moment be sacrificed to their own imprudence and want of courage, as the stones from the crater fell continually around them, and vast rocks of lava bounded by them with great force. At last I had the satisfaction of seeing them retire, leaving me entirely alone. I begged hard for a torch to be thrown over to me, that I might not be lost when the night should come on. It was then that André, one of the cicerones of Resina, afer being promised a bribe, ran over to me, and brought with him a bottle of wine and a torch. We had coasted the lava ascending for some time, when looking back I perceived my companions endeavoring to cross the lava lower down, where the stream was narrower, In doing this they found themselves insulated, as it were, and surrounded by two different rivers of liquid fire. They immediately pressed forward, being terribly scorched by the combined heat of both the currents, and ran to the side where I was; in doing which one of the guides fell into the middle of the

red-hot lava, but met with no other injury than having his hands and face burnt, and losing at the same time a bottle of *vin de grave*, which was broken by the fall, and which proved a very unpleasant loss to us, being ready to faint with excessive thirst, fatigue, and heat. Having once more rallied my forces, I proceeded on, and in about half an hour I gained the chasm through which the lava had opened itself a passage out of the mountain. To describe this sight is utterly beyond all human ability. My companions shared in the astonishment it produced; and the sensations they felt, in concert with me, were such as can be obliterated only with our lives. All I had before seen of volcanic phenomena did not lead me to expect such a spectacle as I then beheld. I had seen the vast rivers of lava that descended into the plains below, and carried ruin and devastation with them; but they resembled a vast heap of cinders, or the *scoriæ* of an iron-foundry, rolling slowly along, and falling with a rattling noise over one another. Here a vast arched chasm presented itself in the side of the mountain, from which rushed, with the velocity of a flood, the clear vivid torrent of lava in perfect fusion, and totally unconnected with any other matter that was not in a state of complete solution, unattended by any *scoriæ* upon its surface, or gross materials of an insolvent nature, but flowing with the translucency of honey, in regular channels, cut finer than art can imitate, and glowing with all the splendour of the sun.

The eruption from the crater increased with so much violence that we proceeded to make our experiments and observations as speedily as possible. A little above the source of the lava I found a chimney of about four feet in height, from which proceeded smoke, and sometimes stones. I approached and gathered some pure sulphur, which had formed itself upon the edges of the mouth of this chimney, the smell of which was so powerful, that I was forced to hold my breath all the while I remained there. I seized an opportunity to gain a momentary view down this aperture, and perceived nothing but the glare of the red-hot lava that passed beneath it. We then returned to examine the lava at its source. Sir W. Hamilton had conceived that no stones thrown upon a current of lava would make any impression. We were soon convinced of the contrary. Light bodies of five, ten, and fifteen pounds' weight made little or no impression, even at the source; but bodies of sixty, seventy, and eighty pounds, were seen to form a kind of bed upon the surface of the lava, and float away with it. A stone of three hundred weight, that had been thrown out by the crater, and laid near the source of the current of lava, I raised upon one end, and then let it fall upon the liquid lava, when it gradually sunk beneath the surface, and disappeared. If I wished to describe the manner in which it acted upon the lava, it was like a loaf of bread thrown into a bowl of very thick honey, which gradually involves itself in the heavy liquid that surrounds it, and then slowly sinks to the bottom. The lava itself had a glutinous appearance; and although it resisted the most violent impression, seemed as if it might easily be stirred with a common walking-stick. A small distance from its source, as it flows on, it acquires a darker tint upon its surface, is less easily acted upon, and, as the stream gets wider, the surface having lost its state of perfect solution, grows harder and harder, and cracks into innumerable fragments of very porous matter, to which they give the name of *scoriæ*, and the appearance of which has led many to suppose that it proceeded thus from the mountain itself, being composed of materials less soluble than the rest of the lava, lighter, and of course liable to float continually on the surface. There is, however, no truth in this. All lava at its first exit from its native volcano flows out in a liquid state, and all equally in fusion. The appearance of the *scoriæ* is to be attributed only to the action of the external air, and not to any difference in the materials that compose it, since any lava whatever, separated from its channel, at its very source, and exposed to the action of the external air, immediately cracks, becomes porous, and alters its form. As we proceeded downwards this became more and more evident, and the same lava which at its original source flowed in perfect solution, undivided, and free from loose encumbrances of any kind, a little farther down had its surface loaded with *scoriæ*, in such a manner, that upon its arrival at the bottom of the mountain, the whole current resembled nothing so much as a rolling heap of unconnected cinders from an iron-foundry.

The fury of the crater continuing to increase, menaced us with destruction if we remained any longer in its neighbourhood. A large stone, thrown out to a prodigious height, hung for some time over our heads in the air. Every one gave himself up for lost, until it fell harmless beyond us, shattering itself into a thousand fragments, which rolled into the valley below. We had not left this spot above five minutes before a shower of stones, issuing from the crater, fell thick upon it, covering the source of the lava, and all the parts about it; so that had we waited, as I begged to do, a little longer, every one of us would have been crushed to atoms.

During my second visit the appearances were pretty much the same. I though the lava flowed slower, and was less in fusion than before, the surface appearing tougher, and being sooner converted into *scoriæ*. We dressed our beef-steak upon the lava, no fire being better calculated for that purpose, owing to the excessive heat it gives.

Upon my third visit I found the lava had taken a different course, and flowed towards the Torre del Annonciato, whereas it had before proceeded in a channel exactly opposite the cross. The source itself had undergone great alterations, and bore strongly the marks of an earthquake.——Bishop Otter's *Life of Clarke*.

There is inconsistency and something of the child's propensities still in mankind. A piece of mechanism, as a watch, a barometer, or a dial, will fix his attention. A man will make journeys to see an engine stamp a coin or turn a block; yet the organs through which he has a thousand sources of enjoyment, and which are in themselves more exquisite in design, and more curious both in contrivance and in mechanism, do not enter his thoughts: and if he admire a living action, that admiration will probably be more excited by what is uncommon and monstrous, than by what is natural and perfectly adjusted to its office,— by the elephant's trunk than by the human hand. This does not arise from an unwillingness to contemplate the superiority or dignity of our own nature, nor from an incapacity of admiring the adaptation of parts. It is the effect of habit. The human hand is so beautifully formed, it has so fine a sensibility, that sensibility governs its motions so correctly, every effort of the will is answered so instantly, as if the hand itself were the seat of that will. Its actions are so powerful, so free, and yet so delicate, that it seems to possess a quality of instinct in itself, and there is no thought of its complexity as an instrument, or of the relations which make it subservient to the mind: we use it as we draw our breath, unconsciously, and have lost all recollection of the feeble and ill-directed efforts of its first exercise by which it has been perfected. Is it not then the very perfection of the instrument which makes us insensible to its use?——Bell.

THE CICADA, AND ITS ORGANS OF VOICE.

The Cicadæ are insects belonging to the order called *Hemiptera*, (half-winged,) on account of the wings partaking generally of a double character, being partly of a leathery substance and partly transparent; in the Cicadæ, however, this distinction is not so apparent. The Cicadæ are found in abundance in most of the warmer parts of the globe; there are also several species, natives of more temperate regions. These insects are noted for the singular noise they produce, and on this account they were in great favour among the ancient Greeks. They were kept in cages for the sake of their song, and were a favourite image of innocence and cheerfulness with the poets of Greece. One bard intreats the shepherds to spare the innoxious *Tettix*, (the Greek name for the Cicada,) that nightingale of the Nymphs, and to make those mischievous birds, the thrush and blackbird, their prey.

Sweet prophet of the Summer, (says Anacreon, addressing this insect,) the Muses love thee; Phœbus himself loves thee, and has given thee a shrill song; old age does not wear thee out; thou art wise, earthborn, musical, impassive, without blood.

The sound produced by the Grecian Cicada must necessarily have been musical; it was called by the same name as the music of the harp.

A Cicada, sitting upon a harp, was a usual emblem of the science of music, which was thus accounted for:—When two rival musicians, Eunomus and Ariston, were contending upon that instrument, a Cicada, flying to the former, and sitting on his harp, supplied the place of a broken string, and so secured him the victory.

The Cicadæ of modern times are equally famous for the power, if not for the musical property of their voice. Dr. Shaw, in his Travels, says,—

In the hotter months of Summer, especially from midday to the middle of the afternoon, the Cicada is perpetually stunning our ears with its most excessively shrill and ungrateful noise. It is, in this respect, the most troublesome and impertinent of insects, perching upon a twig, and squalling sometimes two or three hours without ceasing, thereby too often disturbing the studies or short repose, which is frequently indulged in in these hot climates for a few hours.

The Brazilian Cicadæ are said to sing so loud, that they can be heard at the distance of a mile. On account of the sound this insect produces, it is called in the United States, the American Locust.

The apparatus by which the male Cicada produces the sound for which it is famous, is thus described in Kirby and Spence's beautiful work on Entomology.

If you look at the underside of the body of a male, the first thing that will strike you is a pair of large plates, of an irregular form, B; in some semi-oval, in others triangular, in others again a segment of a circle of greater or less diameter, covering the anterior part of the belly; these are the drum-covers, or opercula, from beneath which the sound issues, at the back of the posterior legs. Just above each operculum there is a small pointed triangular process, (*persillum*,) A, the object of which, as Réaumur supposes, is to prevent them from being too much elevated. When an operculum is removed, beneath it you will find, on the exterior side, a hollow cavity, with a mouth somewhat linear, (like a slit, the width of a line,) fig. 2, A, which seems to open into the interior of the abdomen. Next to this, on the inner side, is another large cavity, B, of an irregular shape, the bottom of which is divided into three portions: of these the posterior is lined obliquely with a beautiful membrane, which is very tense, C; in some species semi-opaque, and in others transparent, and reflects all the colours of the rainbow; this mirror is not the real organ of sound, but is supposed to modulate it. The middle portion is occupied by a plate, of a horny substance, placed horizontally, and forming the bottom of the cavity B. On its inner side this plate terminates in a crania, or elevated ridge, common to both drums. Between the plate and the after-breach, (*post pectus*,) another membrane, folded transversely, fills an oblique, oblong, or semilunar cavity. In some species I have seen this membrane in tension, probably the insect can stretch or relax it at pleasure, but even all this apparatus is insufficient to produce the sound of these animals. One, still more important and curious, still remains still to be described. This organ can only be discovered by dissection. A portion of the first and second segments being removed from that side of the back of the abdomen which answers to the drums, two bundles of muscles, fig. 3, B, meeting each other in an acute angle, attached to a place opposite to the point of the *mucro* (a pointed prominence, like a sharp tooth,) of the first ventral segment of the abdomen will appear. These bundles consist of a prodigious number of muscular fibres, applied to each other, but easily separable. Whilst Réaumur was examining one of these, pulling it from its place with a pin, he let it go again, and immediately, though the animal had been long dead, the usual sound was emitted.

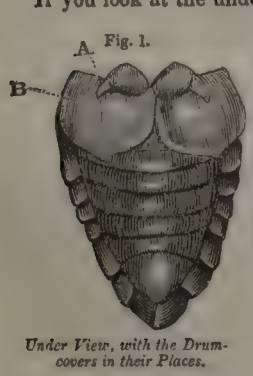


Fig. 1.

Under View, with the Drum-covers in their Places.

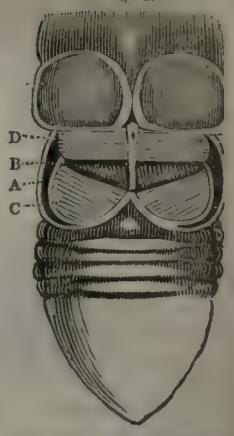


Fig. 2.

Under View, with the Drum-covers turned back.

If these creatures are unable themselves to modulate their sounds, here are parts enough to do it for them, for the mirrors, the membranes, and the central portions with their the cavities, all assist in it. If you remove the lateral part of the first dorsal segment of the abdomen, you will discover a semi-opaque, and nearly semicircular concave-convex membrane, with transverse folds, fig. 3, A; this is the drum. Each bundle of muscles before mentioned, is terminated by a tendinous plate, nearly circular, from which issue several little tendons that, forming a thread, pass through an aperture in the horny piece that support the drum, and are attached to its under or concave surface. Thus the bundle of muscles, being alternately and briskly relaxed and contracted, will by its play, draw in and let out the drum, so that its convex surface being thus rendered concave when pulled in, when let out, a sound will be produced by the effort to recover its convexity, which sound striking upon the mirror and the other membrane before it escapes from under the operculum, will be modulated and augmented by them. I should imagine that the muscular fibres are extended and contracted by the alternate approach and recession of the trunk and the abdomen to and from each other.

Fig. 3

Back View; several Portions of the Skin removed to show the Drum and its Muscles.

The Cicada.

The Drum of the Cicada, and the Muscles by which it is moved.

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A BRIEF HISTORY OF NAVIGATION.

GENERAL FEATURES OF THE WORLD ACCORDING TO THE GEOGRAPHERS JUST BEFORE THE CHRISTIAN ERA.

PART II.

CAUSES OF THE ROMANCE OF ANCIENT NAVAL HISTORY.

WE have already observed that the scene of the earliest known navigation was the Mediterranean Sea, which naturally seemed to the ancients to be situated *in the middle of the earth*; as is implied by its name. As navigation advanced only at a creeping pace, and as but a small amount of fresh experience was laid up by one generation for the benefit of the next, it took very many ages to explore the Mediterranean, Tyrrhene, Hadriatic, and Ægean seas. The people of Tyre and Sidon, the Phœnicians, "whose merchants were princes," (Isaiah xxiii. 8,) were among the first whom the spirit of commerce and the desire of gain had made dissatisfied with what had hitherto seemed the natural limits of marine excursion. The great antiquity of the Phœnicians, however, is perhaps the reason why our knowledge of them is obtained from incidental and isolated accounts: but on the naval spirit and industry of Carthage, a colony planted by the former power, in the ninth century before Christ, the light of history, owing to their connexion with the Romans, is more abundantly shed. With the Carthaginians, perhaps, had originated the idea of quitting the Mediterranean by the straits of Gades, (now Gibraltar,) of sailing southward, circumnavigating the coast of Africa, and then returning northward by the Red Sea, towards the Levant, or eastern side of the Mediterranean. This notion seems to have been cherished for ages, as the prime, the crowning enterprise, long thought of and debated; but which only a solitary few, at long intervals of time determined to try

to effect. Knowing only a portion of the globe, and conceiving that portion to be upon an extended plane, those who held a voyage from Crete to Egypt to be a signal proof of naval courage, and who had never reached Sicily or Africa, but by a wayward tempest, or by shipwreck, and who were then objects of wonder at having escaped the dangers of Scylla and Charybdis, and the Syrtes, those wave-bound prisons of mariners, might justly have feared for themselves, in being committed to unknown waters, and in tracking shores, which the reports of others, who had never seen these regions, no less than their own fears, had represented as the abode of every horror. In short, distance from the land seems to have alarmed all the ancients; who, upon every occasion, when quitting sight of the shore fancied they saw, as Homer tells us,—

> A length of ocean and unbounded sky,
> Which scarce the sea-fowl in a year o'erfly.

The general truth of these observations is corroborated by the story of the Pamphylian, who was taken prisoner, and carried to Egypt. He was kept as a slave, for a very long time, at a town near one of the mouths of the Nile, where Damietta now stands. Being frequently employed to assist in maritime business, he conceived the idea of committing himself to the mercy of the waves in a sailing boat, in order that he might once again behold his native country. Having provided himself, to the best of his means and ability, he set sail, resolving rather to perish in the bosom of the old ocean than to remain longer in captivity. He traversed the vast expanse of waters which lies between Egypt and Asia Minor, and arrived safely at Pamphylia. From this bold and unusual adventure he lost his original name, and received the appellation of *Mononautes*, or *the lone sailor*, which, for a long time after, we may presume, served his family as a patent of nobility. We have the foregoing account from Eustathius, the commentator of Homer.

Navigation has served to bring the families of the earth nearer together, to remove ignorance and barren limitation of thought; and consequently, it has been a means for advancing the landmarks of knowledge and civilization, and for helping man to appreciate the acts of a Divine Providence. But, as it is entirely consonant with humanity that the increase of knowledge should carry with it its alloy of evil, we find that the means for spreading knowledge, served also as a vehicle for the diffusion of falsehood. The accounts, therefore, that have been handed down to us of the exploits of early navigators must be received without prejudice either way, and their errors and their romances must be imputed to the right source. This source seems to be of a twofold nature; firstly, misapprehension in making their observations and statements, arising from ignorance and want of experience, which engender fear: secondly, the love of lucre is so strongly implanted in the human mind, that this affection is oftentimes too apt to get the better of all other feelings, whether good or ill. Hence, in the growing spirit of trade and commerce, the monopoly long enjoyed by the Phœnicians, and subsequently by other commercial nations, was protected by the publication of appalling accounts of the dangers, distresses, and horrors, which they underwent; the dread of which, they hoped, would deter the sailors of other regions from disputing with them a claim to the wealth of the earth. In looking back, therefore, through the vista of time, to the early condition of this world, and in studying the accounts thereof, as handed down from the heathen authors, who are our chief guides, we must separate the probable from the improbable, and the true from the false, and revolve in our minds the progressive condition of mankind, as illustrating the moral government of the Almighty.

VOYAGES RELATED IN ANCIENT HISTORY—FEARS OF THE ANCIENT MARINERS.

THE general correctness of the foregoing observations may be estimated by an epitome, in the way of illustration, of the principal ancient voyages, with which history makes us acquainted. We may remark, in the highly coloured memoirs of the times, that many things which were false were credited then, and still later; whereas, other things, which have been subsequently recognised as perfectly true, seemed at that time so startling to the conceptions of mankind, that no credence was awarded to them. The accounts of the first and third voyages, which follow, are mainly derived from the rhapsodies of the poets.

1. In the thirteenth century B.C., Jason, accompanied by a Phœnician pilot, sailed in the ship Argo, over the Euxine, which we now call the Black Sea, to recover the treasure which had been carried away by Phryxus, in the ship Aries, or Ram. The Phœnician word for *treasure*, is almost the same as the Greek word for *fleece*. Hence, the confusion of ideas, by which the poets profited to adorn their legends, for Jason was reported to have made a voyage to recover the ram with the golden fleece. Those who manned Jason's ship, were called *Argonauts*, or *sailors of the Argo;* and, at their return, declared that their passage had been alongside of the abodes of the just and the prisons of the infernal regions.

Some endeavour to clear up the account of this voyage, by relating that the inhabitants on the eastern side of the Euxine Sea were in the habit of extending fleeces of wool, to catch the golden particles which were washed down from Mount Caucasus.

2. It is believed by some commentators on the Bible, that Solomon, who lived about a thousand years before the Christian era, sent large fleets down the Red Sea, and so eastward to India; or towards the south-west, along the African coast. These ships were managed by Tyrian mariners who were the most expert of the day; yet, for want of the mariner's compass*, their navigation was performed by coasting along the shores; so that a voyage to India is said to have frequently taken up three years, as we read in the Sacred Record. Prideaux thinks that the succeeding kings of Judah carried on the same commerce, which was at length lost, when Elath, their port on the Red Sea, was taken from King Ahaz by Rezin, King of Damascus. (2 Kings xvi. 6.) It would seem as if this intercourse with India was stopped for several centuries after the times we have just spoken of.

3. The following mythological narration may, by a little calm analysis, be found to consist of some degree of truth. Neptune is reported to have delivered the princess Hesione from a monster, raised by some divine interposition out of the sea, and to which she was exposed by express command of the oracle. It is probable that this Neptune was Rameses, who, being a chief of restless disposition, quitted Egypt, his native country, incited either by a thirst of effecting some territorial discovery, or a lust of acquiring by conquest the dominion of some foreign country. Chance or inclination conducted him and his followers to that spot, where their bravery as warriors, and their skill in passing through a country by means deemed preternatural by all not acquainted with them, made them to be honoured and feared, as beings of a superior order. The marine monster we may fairly interpret to have been a vessel, conveying to the same spot some unknown adventurers equally bold, but who, being less powerful, or less fortunate, fell easily before the Egyptians.

4. Necho, King of Egypt, in the year 610 B.C., endeavoured to solve the grand nautical problem of Africa. He employed Phœnician navigators to set sail from the Red Sea, which lay at the east of his dominions, and to explore towards the south. We are told that they spent three years in the voyage; and, as the ships of the ancients did not admit much room for stowing away provisions, they debarked at times on the coast, sowed grain, waited its ripening, reaped, prepared food, and again set sail. This they did in each year, being favoured with the maturing beams of a tropical sun. At length, to their great joy and astonishment, they reached the Straits of Gibraltar, passed between the pillars of Hercules, two rocks being the nearest and opposite points of the continents of Europe and Africa, and at length arrived safely at the shores of Egypt.

In the publication of this memorable voyage, the world was astonished at being informed, that the sun, while the Phœnicians were passing round the southern part of Africa, was at their right hand; or, in other words, that it described its course from East to West, in the northern heavens; or, speaking still more simply, that it appeared at mid-day in the north, contrary to their former experience.

To an inhabitant of the equator, the sun will appear at noon, during one half of the year, in the north; during the rest of the year, in the South. At the southern promontory of Africa, or Cape of Good Hope, which is below the southern tropical line, the sun will always appear to attain its meridian in the north; and it is evident that the order of their voyage would keep the coast on their right hand continually.

We are given to understand that the relation of this voyage was almost universally discredited among the an

* See *Saturday Magazine*, Vol. III., p. 116.

cients, for the very reason which should have moved them to belief: namely, the appearance of the Sun in the North at mid-day.

5. Darius, the son of Hystaspes, being the sovereign of the vast Persian Empire, was influenced by that insatiable ambition which has distinguished all conquerors. He planned an expedition to India, about 510 B. C., in order to conquer the country; but that he might not proceed without knowing something of the nature of the country he was about to attack, he fitted out a naval expedition, which he placed under the command of Scylax, the Caryandæan, giving him orders to sail down the river Indus, into the Southern Ocean; then to return by steering westward, and to make the best discoveries he could, as to the strength and riches of the countries on both sides of the river, as also on the sea-coast. Scylax, in pursuance of these instructions, passed down the Indus into the Indian Ocean, and returned by the straits of Babelmandel into the Red Sea, and landed on the Egyptian coast, near the neck of land which we now call the Isthmus of Suez. Scylax employed about thirty months in making this voyage; and gave a favourable report to Darius concerning the nature of the countries which he had seen. Accordingly, Darius fitted out a naval armament, which was to co-operate with his army, in the subjugation of the Indians; this attempt of Darius was successful; and opened the way for a more frequent intercourse between India and the nations bordering on the Mediterranean. The voyage of Scylax is believed to have been the first maritime expedition to India.

6. The next attempt to sail round the continent of Africa was that of Sataspes, a Persian nobleman, whom Xerxes had condemned to death, but whose sentence was commuted to the circumnavigation of Africa. He sailed from Egypt, in the year B. C. 480, through the straits of Gibraltar; and then southward. But, horror-struck at the mighty waves of the Atlantic, those walls of water, which dashed upon the shores of the desert,—after beating about for some months, he returned home, and suffered according to his original sentence.

The Persians were generally unacquainted with maritime affairs, and therefore never made any advance in the naval art, worth describing; this accounts for the want of perseverance on the part of Sataspes and his crew. The Athenians had made great improvements in their war-shipping, when the Persians attacked them during the reign of Xerxes. These improvements related chiefly to the formation of decks over the rowers, whereon the men of war carried on their operations without interfering with the rowers, and impeding the motions of the ship. This is believed to have contributed greatly to the success of the Athenians over the Persians, in their naval conflicts with that power.

7. In a collection of ancient voyages, published about one hundred and thirty years ago, there is a curious account of the discovery of an island, about five or six hundred years before Christ. There can be no doubt that this narrative is founded in truth; but that it is made more important than it really was by exaggeration, and a love of the marvellous. It is a translation from an ancient writer.

"There was one Jambulus, who from his youth was addicted to learning: his father was a merchant; and, after his decease, the son applied himself, with great diligence, to the same profession. This man, travelling into Arabia, in order to purchase spices, was there taken prisoner, with all his company, by a party of robbers. At first, he and one of his companions were employed in keeping sheep; but they were soon after carried off by the Ethiopians, inhabiting the coast, who conveyed them into their own country, in order to serve a very extraordinary purpose. These Ethiopians had a custom, which had then subsisted six hundred years, and was originally derived from the direction of an oracle, to expiate the sins of their nation once in an age, or generation, which with them comprehended the space of thirty years, by exposing two strangers, in the following manner:—

"They prepared a little vessel, well built, and extremely well equipped, with provisions for six months; on board of which the men were put, at a certain season of the year, with instructions to steer directly south, in order to arrive at a certain fortunate island, inhabited by a king and some hospitable people, with whom they might live happily all the rest of their days. The oracle declared, that if these men succeeded in their voyage, the country would enjoy rest and quiet for many years; but if, frighted by the dangers of the sea, they should return, it was ominous to Ethiopia; and therefore, they threatened Jambulus and his companion with the severest punishments, in case they did not prosecute their voyage. When the season of the year came, the Ethiopians celebrated the festival of Purgation with most splendid sacrifices; and then, having crowned each of them with garlands, they put Jambulus and his companion on board the vessel that had been prepared for them, and obliged them to put to sea.

"They were four months tossed by the winds and waves, before they arrived on the coast of the island to which they were bound; but at length they reached it safely. In its form it is almost round, being about five thousand stadia in compass; containing about five hundred of our miles, if we allow six hundred stadia to a degree. As soon as they came within sight of land, the people on the island crowded to the shore, to behold them: and, when they landed, multitudes came from all quarters to gaze at and admire them, wondering how they came thither; but treating them with the utmost kindness and civility, and offering them, with the greatest readiness, whatever their country afforded.

"These people differed not a little from other nations in their appearance, as well as in their manner; for they were all of a pretty equal size, each of them about four cubits, or six feet high. They bent and turned their bodies with such agility, that their bones seemed to our travellers as flexible as the sinews of other people: their bodies were very tender, notwithstanding which, they were so strong, that whatever they grasped could not be forced out of their hands. On their heads, eye-brows, eye-lids, and on their chins, they had hair; but the rest of their bodies was perfectly smooth. They were handsome and well-shaped; only the holes in their ears were much wider than those of other men, and had fleshy protuberances in them. Their tongues were very singular, being by nature somewhat divided, and cut in their infancy to the very root, so that they seemed double, which enabled them to imitate the notes, and even the chattering of birds; and, if our travellers say true, they could discourse with two people at once.

"This island is situated in a most excellent and moderate climate, lying very near the Equator, so that the people are neither scorched with heat nor perished with cold; enjoying at once, all the seasons, without any division, like ours, of Spring and Harvest. The days and nights there are always of equal length; neither is there any shadow at noon-day, because the sun is directly in the zenith. They are learned in all sorts of sciences, especially in Astrology. They use eight-and-twenty particular letters, for the expressing what they mean, composed of seven characters, each of which is varied four ways. They live long, without ever being sick, and commonly to one hundred and fifty years of age.

"After Jambulus and his companion had continued in this island seven years, they were compelled to depart, as persons of a vicious life, and not to be broken of foreign customs. Their ship, therefore, being again fitted out for them, and well furnished with provisions, they were constrained to put to sea; and, after continuing their voyage for above four months, they fell, at length, upon the sandy shallows of India, where his companion was drowned, and himself was afterwards cast ashore near a certain village, and carried away by the inhabitants of the place to the king, who was then at a city called Polybothra, or Polimbothra, many days' journey distant from the sea; where he was kindly received by that prince, who had a great love for the Grecians, and was studious in the liberal sciences. At length, having obtained provision from the king, he first sailed into Persia, and from thence safely arrived in Greece."

It has been supposed by most commentators on the above account, that the main incidents are true; but, as was before observed, they have had a tinge of the mavellous imparted to them. With respect to the island mentioned, some have supposed it to be Sumatra,—others Borneo,—others again Java,—while one writer has considered it to be one of the Maldive Islands.

8. About 500 years B. C. the Carthaginians fitted out two expeditions, for the sake of prosecuting discovery to the north and to the south, after clearing the Herculean straits. Hanno commanded one fleet, and proceeded southward, along the coast of Africa; and Himilco steered northward, along the Hiberian and Gallic shores.

Those under Hanno, steered round by Mount Atlas, the pillar of heaven, and doubled "the African Forehead," as its great western promontory was called. By day the land was too hot to walk upon, the country seemed to lie silent

REPRESENTATIONS OF WAR-GALLEYS ON ANCIENT ROMAN COINS.

and deserted, in the full unmitigated glare of a vertical sun, but by night the mountains seemed on fire, songs of rejoicing were heard, accompanied with the sounds of flutes, drums, cymbals, and gongs, together with cries, which waked the shrill echoes of night, and startled the senses of the Punic sailors. Scarcely different have been the records of modern travellers, respecting the inhabitants of these tropical wilds; who, fearing to be scorched by the solar ray, pass the day in caverns, or in sylvan shades, and wake up into lively existence under the milder beams of the moon and stars. Here they saw the various species of the monkey-tribe, pre-eminent among which is the ourang-outang,—original of Satyrs. The Thessalians had, before this, given rise to the fables of the Centaurs, by appearing to their neighbours on horses, which they had been the first to tame. In these places gold was found to be the universal metal; so common that the chains of captives were forged from it. The Carthaginians relate that the transactions which they had with the people of the African coast were carried on in dumb-show, that, a signal having been made with smoke, the savages placed the goods which they had to dispose of on the coast and retired, and that the Carthaginians, having removed these goods, deposited an equivalent. If that which the latter laid down, did not satisfy the former, it was not removed until a suitable addition had been made. This sort of barter is the primeval state of commerce. They were once astounded at the sight of sheets of flame, traversing the country and spreading in every direction down to the sea-shore; a conflagration made by the natives to get rid of the dry and waste grass at the end of autumn. Such were the causes of Africa being the reputed dwelling-place of the Gorgons, and other monstrous creations, springing from ignorant fear. Pliny tells us that this voyage was effected round the whole extent of the African continent.

Himilco, we are told, sailed as far as Britain and Ireland, the great Western Islands. It is generally, and with great reason, believed that the Phœnicians, and subsequently the Carthaginians, traded to the south-western coasts and islands of Britain for tin. Hence, Cornwall and the Scilly Isles were called by the ancients *Cassiterides*, or *Tin-countries*, a term derived from the Phœnician and Sanscrit.

9. Pytheas, an illustrious navigator of antiquity, who flourished in France, at Marseilles, a colony from Greece, about 400 years B.C., directed his course to the north-western parts of Europe. He reached Britain, then called Al-fioun (Albion), or White-land, from the appearance of its cliffs at a distance. He kept on sailing, we are told, towards the north, and arrived at Thule. This is supposed to have been Iceland. Of this place, as also of the other islands and coasts of this sea, he relates that he found, in some parts, the light of the setting sun continuing so strong, till dawn of day, that the stars could not venture to appear; in others he found the sun shining by day and night. This account seems to have perplexed those who would otherwise have been inclined to credit him; but this fact, related by Pytheas, is quite natural during the middle of our summer, when approaching towards the Arctic circle. The converse of this, the polar winter, or the effects of it, felt less in proportion to the diminution of latitude, may apply to the account which we have of Ulysses, who, we read, sailed, *perhaps at the fall of the year*, to the ends of the ocean, where the Cimmerians dwell in profound gloom, who see neither the rising nor setting sun, but have the veil of night for ever spread over them. The credit of Pytheas was not much improved by his accounts of the four and six-horned sheep on the shores of the Baltic; but modern information attests the general accuracy of the Massilian sailor. Some part of his story wears, at first sight, a fabulous aspect; when we find from Tacitus, who retails it from him, that the noise of the sun in its passage below the ocean is heard; and that the figures of the gods appear visible, crowned with immortal light. By the latter observation we are to understand the varied effects of the Aurora Borealis; by the former the hollow noise of the rolling sea against the dreary shores of Norway. He intimates, that, in going very far to the north, sea, land, and air, seemed all confused; owing perhaps to fogs:—and that the water was of such a dense character, as could hardly be cleaved by the ship's prow; alluding, perhaps, to the strong tides of those seas. He is said to have been the first who ascribed the tides to the influence of the moon. The vulgar opinion, even up to the time of Mela, in the middle of the first century after Christ, was that the earth was a huge animal, the heaving of whose breast occasioned the rise and fall of the waters. Another opinion was, that the ocean had within itself vast caves, into which the water was regularly received, and out of which it was again as regularly ejected. Previously to quitting the Mediterranean, the tidal influence had not come under the consideration of man. This sea scarcely indicates any perception of that lunar attraction, which operates upon the waters of the earth generally. The probable reason is, that this sea, as also the Baltic, which admits of a parity of reasoning, is almost entirely cut off from the main oceans; and that the narrowness of the connecting straits does not allow the swell of the great waters to be felt within the requisite time of the moon's passing the meridian.

10. Before speaking of the naval exploits of Alexander the Great, of Macedon, we may mention that Curtius gives a circumstantial account of a fire-ship, which was equipped by the Tyrians, at the time their capital was besieged by Alexander. Having selected one of the largest galleys they possessed, they loaded it by the stern with stones and other ballast, so that the prow became considerably elevated above the surface of the water. The whole of the vessel, which was above water, was covered very thickly with sulphur and other inflammable substances; which operation being completed, advantage was taken of a wind favourable for the attempt, and all the sails being set, the crew, who, in aid of the sails, used their oars also, directed it towards the mole which Alexander had, with so much difficulty, laboured to construct. When they had approached sufficiently near to the destined object of destruction, the vessel was set on fire, and the crew jumped into boats, which had followed for the purpose of receiving them. This project completely succeeded, and Alexander was frustrated in his attempt on Tyre at that period. This place he ultimately subdued, and having no more land to conquer he sought the waters.

We now come to the voyage of Nearchus, the Macedonian admiral, down the Indus, along the Erythrean Sea, and up the Persian Gulf, as far as the mouth of the Tigris. Alexander the Great, having made himself omnipotent by land, resolved to encroach, at least by his lieutenants, on the realms of ocean. He therefore set in motion an expedition for maritime discovery. He sailed at the head of the fleet down the Indus, and gazed upon the expanse of ocean, which the ancients deemed the circular boundary of the world. The ocean had been held, from the oldest times, to be a river running round the earth; which river was bounded by the dark clouds of heaven. Such, we are told, was it depicted on the shield of Achilles, which seems to have presented on its surface, a map of the world, as then known. That this notion was very ancient we learn from the Sacred Writings;—"When I made the cloud the garment thereof, and thick darkness a swaddling-band for it." Job. XXXVIII. 9. The writer of the Book of Job probably lived nearly 2000 years before the birth of our Saviour, Christ.

We find that Alexander, at sight of the crocodiles, for some time confounded the Indus with the Nile; owing pro-

bably to the saying of Herodotus, that the Nile and the Indus were the only rivers, in which the crocodile had been seen. Having arrived at the mouth of the Indus, the Grecian army was terribly alarmed at the sight of the huge and awful billows, which rolled in at the mouth of this river. They had perhaps never seen the ebb and flow of the tide before: so that scarcely any officer of this vast and magnificent army could be got to head the further progress of this enterprise; for all felt doubt and dismay at the sight of the ocean, whose breast heaving, in this part of the globe, with higher tides than in most other seas, seemed to portend celestial vengeance at their impiety in approaching the limit of the world. This horror had been increased by finding, at break of day, their ships, which they had anchored during night, left on dry ground by the ebb of the tide. When, however, Nearchus had accepted the command, and they had got out to sea, the first thing that struck their attention was, that the sun being vertical at noon day, they projected no shadow, and that upon occasion, it even deflected towards the south; that stars which they had seen high up in the northern sky, now decreased in altitude, or sank altogether below the horizon; and that others, never visible before, now rose up in the south. As Nearchus coasted along Gedrosia, now Beloochistan, his sailors saw, for the first time, the whale, spouting out streams of water into the air, which, descending like a whirlpool, so alarmed the sailors, that their navigation would have been at an end, had not Nearchus, by raising the shouts of his men, and the din of trumpets, terrified and scared down the monster of the deep. For a great part of their voyage they found it difficult, or impossible, to procure corn, so that they were reduced to live upon fish; and, worse than all, as these Greeks dolefully complained, on the flesh of turtle, which abounded on the coast!

11. The voyages of Eudoxus now claim our attention. He was a native of Cyzicus, who flourished about 130 years B. C. He seems to have been an officer of fortune. Like many others, whose ardent minds have impelled them to explore, and to relate, things strange and unheard of, he has been misrepresented and ridiculed by the geographers and critics of his time. There is a natural indisposition to believe that which does not accord with one's own experience; through which incredulity we are sometimes as liable to err, as by an unthinking confidence. Bruce, the celebrated traveller, at the end of the last century, who had related the circumstance, not unusual, of an Abyssinian cutting steaks from the flank of a cow, skewering up the wound, and then driving her out to pasture, was thus satirized by the witty poet of the day:—

> Nor have I been where men—what lack, alas!
> Kill half a cow, and turn the rest to grass.

Eudoxus made several voyages down the Red Sea, and towards the East, at the instigation, and with the aid of Ptolemy Euergetes, king of Egypt, and his successor; but, eager to pursue the grand object of nautical honour, the circumnavigation of Africa, he seems to have eschewed royal patronage, and to have set out on his own account, with the assistance of some friends whom he got to join him.

We ought to observe that the traditions, or records, of the circuit of Africa, having been formerly made, were now becoming apocryphal; the geographers of the times having decided that the regions to the south, or the torrid zone, were utterly uninhabitable, by reason of the extreme heat, while the regions to the north, forming the frigid zone, were unapproachable, by reason of the intense cold. They believed, theoretically, that there was another temperate zone, corresponding with their own, beyond the torrid; but that this southern temperate zone was completely severed from the northern by unendurable heat. Hence, in the time of Mela and Ptolemy, it was believed that the ocean passed through Africa, and that the Nile rose in the southern division, and, flowing under the sea, appeared again in Upper Egypt.

For some time all proceeded favourably, until the crew of Eudoxus, fearing lest they should be swallowed up amid the heaving billows of the Atlantic, urged the vessel so close to the shore, that it was stranded on one of the dangerous sand-banks abounding on the coast. A smaller and more compact galley of fifty oars, was formed from the fragments of the stranded vessel; in which ship he continued to proceed southward, but was at last forced to return, his resources not being equivalent to the end proposed, after the disaster of the shipping. He is said to have made a second attempt, with the issue of which we are not so well acquainted. He seems to have been set down as an impostor; and is reported to have told many fables and other absurd stories of his voyages and adventures. According to some, he really made the circuit of Africa. Some nations he found dumb; which relation has in it a stroke of probability, for, not understanding the language of foreigners, the natives might have thought it as well to be silent.

Of some people he related, we are told, that they had no tongues, of others, that being mouthless, they received their food up the nostrils. Some nations, we know, completely cover up the lower parts of their faces; but the account of things originally true, though strange, becomes exaggerated and distorted by passing from one narrator to another. In a word, this navigator seems, by common consent, to have been more meritorious than fortunate.

12. When the Romans began, and continued to practise navigation, it was to serve their purpose of conquest; but, to gratify their luxury, the extremities of the known world were ransacked, and thus maritime enterprise was indirectly promoted. Their ships, when unemployed in war, made a survey of the dominions which their power had acquired. Thus, at the end of the first century of the Christian era, Agricola, the governor of Britain, discovered it to be an island by sailing round it. The opportunity of surveying the coasts of the Erythrean Sea was furnished by the regular trading voyages, undertaken by the Alexandrian merchants from the north of the Red Sea down into the Indian Ocean, which was the ancient Erythrean. The merchant-vessels of the Roman empire seem to have navigated this sea to the right, as far south as the Isle of Madagascar; and to the left, as far as the coasts of

ROSTRA AND HEADS OF ANCIENT SHIPS.

Malabar, of which Arrian, who flourished about A. D. 140, gives us an account, in his work called the *Periplus*, or *Circumnavigation*. The general facts herein related do not differ materially from those which have come under modern observation; the people of the coast are little changed in manners or living, their country has the same appearance, and its productions are much the same as the author of the *Periplus* alludes to.

With regard to the form of the vessels, employed by the Phœnicians and other neighbouring nations, about the same period, it seems that those vessels intended for commercial purposes were without keels, and bore a certain resemblance to the barges of the Hollanders at the present day. They were flat-floored, round, broad, drawing little water, and of very great breadth, in proportion to their length; so that they might be capable of containing a larger quantity of commodities than would be the case under any other form. Their floor-timbers were continuous; and, with the addition of one futtock only on each side (called by the Greeks *encœlia*, meaning the ribs or internal parts of the animal body), the frame was completed.

Before the introduction of the keel, the framework of the vessel was formed of timbers bent round, and kept in the curved form by beams passing across, to which the timbers were bolted; but as this was a laborious practice, the keel became introduced, by which the necessary shape of the frame was more easily ensured. The Latin word for *keel* is *carina*, from *curro*, to *run*, alluding to the mode in which the keel runs or cuts through the water. The frame was covered with planking; the planks being fastened to the frame by large nails or bolts formed of iron, some of which passed through both plank and timber, and were clenched at the end to render the fixture more complete. It has been ascertained, that the mode of dove-tailing, which is now so frequently applied in carpentry, was known in those days; for when the planks were not long enough to reach from stem to stern of the vessel, they were joined end to end, the ends being dove-tailed into each other, by which they were prevented from starting out from their places.

We may here notice, in addition to what was said in the first article, a strange mode of attacking an enemy, as adopted by Hannibal, in a war with Pontus; which was by throwing vessels filled with snakes on the enemies' decks. The ships of Pontus thought it strange to see potters' vessels hanging from the yard-arms of Hannibal's ships; but when those same vessels were thrown on their own decks, and snakes were perceived to crawl out of them, the effect produced was just what Hannibal had anticipated; namely, that the uncommon event frightened and dismayed a brave people, who would not have shrunk from any of the ordinary dangers of war. On other occasions, casks containing inflammable matter were hung from the projecting head of the vessel; and when the head was brought so as to be over the deck of the enemy's vessel, the casks were opened, and the inflammable matter shaken out, and precipitated upon the deck. Sometimes these casks were placed on the ends of long poles, placed across or aslant the deck.

There seems reason to believe that the destructive purposes of war were more conducive to the improvement of ships than was the peaceful object of commerce: accordingly, the strengthening and improvement of the timbers and other parts of a vessel became more and more an object of attention, as nations became more and more involved with each other in political or warlike dissensions. Experiments were made, and experience was appealed to, as to the best kinds of wood for ship-building. The Phœnicians, the Grecians, the Carthaginians, and the Romans, successively directed their thoughts into this channel. The fir was found to be the lightest, as well as the easiest to work: the oak, on the other hand, though more difficult in application, proved to be the strongest and the most durable. Besides these, the elm, the cedar, the cypress, the pitch-pine, the ilex (a species of oak), the ash, and even the alder, were severally tried: the oak, the fir, and the pitch-pine, were those in general use.

As the science advanced in general use and repute, practice and experience introduced certain maxims, some of which were really found necessary, while others were whimsical and capricious. Hesiod, for example, informs us that it was deemed improper to fell any timber for the purpose of ship-building, except on the 17th day of the moon's age, because, it being then in the wane, the sap or internal moisture, which is the grand cause of early decay, would be considerably lessened. Another writer extends the time, and allows that if trees be cut down between the 15th and the 23rd days of the moon, they will endure for a long time without perishing; but he adds that, if that limitation be transgressed, the daily practice and experience of all artisans may convince the world it would become worm-eaten and rotten in an incredibly short space of time. Some supposed that the timber felled on the day of the new moon was absolutely incorruptible; they were even attentive to the quarter from whence the wind blew, and to the season of the year; for instance, in the beginning of Autumn it was deemed improper to fell timber for ship-building, except the wind was westerly, or, in the Winter, unless it blew from the north.

THE ROMANCE OF ANCIENT NAVIGATION, AS INDUCED BY THE DESIRE OF MONOPOLY IN TRADE.

We must now say a few more words on the motives, which are presumed to have led the Phœnicians, and the subsequent mariners of antiquity, to the affectation of mystery and horror, with which they were so wont to shroud all their naval enterprises. The Phœnicians, so celebrated for commerce, and consequently for navigation, whose pilots manned the ships of the nations, and conducted the vessels of Solomon over the Red Sea, the Persian Gulf, and the Mediterranean, as far as Tarshish, "the silver country," are placed even by Homer in a most unfavourably moral light. Iniquity and deceit are their characteristics, both in Sacred and Profane history. Hence the term "Punic faith," as applied to the Carthaginians, implied *treachery*. The especial source, to which the equivocal conduct of the people of Tyre and Sidon may be traced up, is their desire and endeavour to preserve to themselves exclusively the trade and commerce of the world; possessing, as they did, the privilege of serving the Egyptian, and other nations, whose religion deterred them from pursuing maritime enterprises. The people of Egypt had long ceased to cultivate the naval art; for they dreaded the sea, which swallowed up their great divinity, the Nile. This river the Phœnicians were never allowed to enter. In such sort did the Arabians, in after ages, become navigators for the Hindoos, who were superstitiously afraid of the sea. This gave the Phœnicians power, wealth, pleasure; in short, every advantage, whether for good or ill, which this world furnishes. They were also the great slave-traders of the world. Having once attained to this pitch of envied distinction, they could not bear the idea of putting their convenience in jeopardy, as they knew, or fancied, they must do, if rivals competed with them in the foreign markets. This leads us to suspect the motives, which made Hiram, the Tyrian monarch, sneer at the inland cities, given up to him by Solomon. The Phœnicians wanted, doubtless, a harbour for ships, such as that of Joppa. The keenness and activity of the Greeks was justly formidable to them. They therefore went upon a bullying system; and, like arrant braggarts, told how they had met in various climes with—

> The Cannibals, that did each other eat,
> The Anthropophagi, and men whose heads
> Do grow beneath their shoulders.

The Phœnicians, with Tyre and Sidon as their two principal cities, engrossed, as has been before stated, by far the greater part of the commerce of the then known world: they brought the gold, and gems, and spices of the East from India, Persia, &c., to Tyre and Sidon, by caravans or land-carriage, and distributed them to the nations of the West by means of their shipping on the Mediterranean. From an early period, however, they thirsted to gain possession of some port, which should give them a command of the navigation of the Red Sea. This object, for a long time, they could not attain; for the eastern shores of the Red Sea, or Arabian Gulf, were in the hands of the Arabians and Assyrians, while the western shores were in the power of the Egyptians and Ethiopians. They therefore strove to obtain possession of some port on the Mediterranean, near what is now called the Isthmus of Suez, in order that, by a land-carriage of a few miles, they might connect together the navigation of the Mediterranean and the Red Sea. This object they attained by gaining possession of Rhinocorura, a city on the boundary between Palestine and Egypt. By this plan they extended their commerce to a vast extent, by making the Red Sea the channel of communication between Tyre and the eastern countries, instead of transporting their commodities by land.

The jealousy with which the Phœnicians regarded any attempt on the part of other nations to share with them

the advantages and profit derivable from commercial navigation, was strikingly shown in numerous instances. If, at any time, when bound on a foreign voyage, they observed a stranger in company with them, and found him endeavouring to pursue the same track, they immediately altered their intended course, using every possible means to avoid him, and to prevent him from following them; it is even asserted that they often purposely risked the loss of their vessels and their own lives, rather than afford the inhabitants of any other country than their own the smallest opportunity of breaking into their monopoly, or holding any share whatever in the commerce of the world. So fearful were they of rivalship, and so pertinaciously bent were they on keeping everything to themselves, that to add to the natural dangers of the seas, and to increase such discouragement as might prevent other nations from exposing themselves to it, they became pirates, and declared themselves at war, by turns, with every country in the then known world; whenever they met with vessels to which they thought themselves superior in force, and consequently able to overcome.

Terrific accounts of the dangers of foreign navigation were propagated among the lively, but credulous, people of the Morea, who not only received these stories with facility, but added embellishments of their own to that which had already been ungraciously imposed upon them. The Greeks, too, possessing an open and communicative spirit, promulgated these accounts in their various writings; and with all the skill which proficiency in literature could effect. From the Phœnicians, therefore, for evident reasons, nothing to the purpose could be learned. The Romans, by destroying all their records and vestiges of ancient glory, hoped that nothing would be learned from the Carthaginians.

What little knowledge, dimmed by the length of its passage, people had of the East, came to them by commercial transactions. They heard that the precious commodities of the East were obtained under circumstances of peculiar difficulty and peril. So hideous and alarming were the objects to be encountered, after escaping the dangers of the sea, that the task of purveying the desired luxuries was gladly relinquished to those who chose to undergo such danger. The golden sands of India swarmed thickly with ants, as big as foxes; and wonderful caution and expedition was necessary in gathering up the precious dust, loading it on camels, and getting off, before swarms of these monstrous insects should environ and destroy both men and beasts. Cinnamon, Herodotus tells us, was brought from the country of Bacchus, that is, India. It was carried into Arabia by certain birds to form their nests with, which were built on dangerous and inaccessible places. The Arabs would strew large pieces of flesh below their nests, which the birds descending would carry off to their young. The nests would break down with the weight, and an opportunity of gathering up the cinnamon was afforded. Cassia was found on the borders of a lake by persons covered over with hides and skins, to save themselves from the assaults of enormous bats, which occupied the neighbouring trees. The real truth seems to have been since made out; that these celebrated spices, which the Egyptians sought after, and which the Hebrews used in the composition of the holy anointing oil of the tabernacle and of the other sacred things, were brought from the coasts of Malabar, the islands of Ceylon and Sumatra, and other eastern regions, by Arabian merchants, from the earliest times; that the Arabs, in fact, engrossed the East Indian commerce, until the discovery of the monsoons, and navigation had so far advanced, as to enable the Greeks to steer off from the shores of Arabia. For many ages these Arabians were met by the Phœnicians, whose place was afterwards usurped by the Greeks. Whether frankincense came originally from the land of Arabia, or from the mountains of India, as some say, winged serpents were its jealous guardians. We are also told of trees bearing wool for fruit, by which is meant the cotton-trees.

It would be tedious to dwell upon the stories of Sirens, who seduced and changed the hardy mariners into beasts; of one-eyed Cyclops, to whom the human kind were but as insects, and who cut the tallest trees of the forest for their walking-sticks; people with the heads of horses; the pigmies and cranes; confounded perhaps with the monkeys; the horned birds; the Phœnix; the Sphynx,—

> Perverse, all monstrous, all prodigious things,
> * * * *
> Gorgons, and hydras, and chimeras dire.—Milton.

All such, then, are mere inventions, which arise, as the foregoing pages will show, from fear and misapprehension; in proportion to the ignorance of the mariner, or from his interested and selfish motives.

THE MONSOONS: A KNOWLEDGE OF THE EARTH INCREASED BY NAVIGATION.

The first great natural relief, given to ancient navigation, was the discovery of the trade-winds which prevail in the Indian Ocean. These winds, from the dependence which may be placed upon them, and from their consequent value to navigation, are called *trade-winds*, and extend about thirty degrees on each side of the Equator. These winds, however, maintain their regularity only in the open ocean. Where land breaks the continuity of the liquid surface, great changes are produced; but the most remarkable effects exist in the Indian Ocean. The third degree of south latitude is a boundary between distinct winds; from that boundary northward to the continent of Hindostan, a north-east wind blows from October to April, and a south-west from April to October; while from the same boundary to the tenth degree of south latitude, a north-west wind blows from October to April, and a south-east from April to October. These winds are called *monsoons*. The term *monsoon*, or, according to the Persian, monsum, implies *seasons;* and is so used in the Malayan, *moossin*, and other dialects of the East. The *breaking up of the monsoons*, or periodical changes in the direction of these winds, divides the Indian year into two *seasons*. The monsoons on the eastern side of the globe, originate with the trade-winds, of which they are a species, produced by the diversity of continent and islands, seas and gulfs, in this part of the world. These periodical currents of winds, if noticed by the Arabians, were not made to serve their maritime trade, until the keener enterprise of the West, in the person of Hippalus, about 50 A.D., first ventured to steer off from the Arabian and Persian shores, and to be impelled eastward in the direction of the wind. A voyage which had consumed years, now took up but as many months, by a conformity, on the part of the mariner, with this invariable law of nature. The means of profit and information were now less monopolized, and the West became better acquainted with the inhabitants and produce of the East.

The navigation to the Indies was continued, when the Romans became masters of Egypt, by sailing down the Arabian Gulf, and from thence to the mouth of the river Indus, along the southern coasts of Arabia and Persia. But, under the Emperor Claudius, this route was so far changed, that after emerging from the Arabian Gulf, they cut across the Indian Ocean directly to the mouth of the Indus, by noticing, and taking advantage of, the time when the south-west trade-wind blew. The trade was carried on with India thus:—The goods that were intended for the Indian markets, were embarked at Alexandria, and carried up the Nile, a distance of about three hundred miles, to Coptus. From the latter place, the merchandise was carried on camels' backs to Berenice, a distance of two hundred and sixty miles. Berenice is on the shore of the Red Sea, and there the goods were warehoused, until the proper season for sailing; when they steered for the opposite coast of Arabia, and took on board frankincense, and other Arabian commodities, giving arms, knives, vessels, &c., in return. They now proceeded on their voyage to India; whence, having disposed of their articles of merchandise, and got gold, spices, drugs, &c., in return, they pursued their voyage back to Alexandria, where they usually arrived about December or January. The Indian commodities were conveyed from Berenice to Alexandria in the way before described; and a fleet sailed annually from the latter place to Rome, conveying the treasures of the East.

When the Constantinopolitan empire was formed, by the division of the Roman empire into two parts, their maritime and commercial arrangements were very extensive. One fleet, called the fleet of Alexandria, was destined to bring to the capital the produce of India, as conveyed to the Red Sea. Another fleet was that of Seleucia, on the river Orontes, by which an intercourse was kept up with Persia, and higher Asia. A third fleet was stationed in the Euxine, or Black Sea, by which intercourse could be kept up with the nations of Eastern Europe, while at the same time a check could be given to the ravages of the uncivilized tribes of Scythia.

Various opinions were held by the ancients respecting the form and surface of the earth. The followers of Thales believed the earth to be a sphere; this was about 600 years B. C. The successors of Thales got into the notion that it was of a cylindrical form: some gave it the shape of a drum; others of a cube. Many believed it to be a high mountain, with an infinitely extended base, and that the stars moved round and round its summit; but Heraclides, the disciple of Aristotle, who lived about 335 B. C., actually taught that the earth had the figure of *a ship*. Some Indian sects are said to hold similar opinions. Anaximander, the disciple of Thales, was the first who represented the earth by maps and spheres.

With the improvement of navigation, advanced the knowledge of the earth; both, however, being still imperfectly understood:—witness, Strabo's comparison of the Spanish peninsula to "a hide spread out." The ancients knew that a great boundary to the West was formed by the Atlantic Ocean; but the confines of the earth towards the East they supposed were illimitable. Hence the distance on the earth's surface, measured from W. to E. they termed *Longitude*, or *measurement in length*, which they supposed infinitely greater than the *measurement in breadth* N. and S., which they termed *Latitude*. The knowledge of this began to be made practically useful for fixing the positions of places, hitherto often doubtful, on the earth's surface, by Ptolemy, in the middle of the second century of the Christian era. But this, the most celebrated geographer of antiquity, only approximates towards correctness. The Mediterranean Sea he makes 20° too long; the breadth of the Caspian Sea he makes to exceed the length; and the mouth of the Ganges is placed 46° out of its place. Nor can we wonder that the maps of the ancients should be incorrect, when, not yet possessing the magnetic needle, their sailing bore no reference to the heavens, and their maps were formed from road-books or itineraries, wherein marching distances were set down by the guides of an army; or from a sort of log-book, wherein was inserted the distance the ship had sailed, as calculated from point to point. But it surprises us at learning that the two former errors, mentioned above, were not corrected in modern maps until the first half of the last century.

To a nation which has an insular position, or good command of the sea, a naval force (which Themistocles, nearly 500 years B. C., understood the oracle to mean, when it advised the Athenians to defend themselves with wooden walls,) has been found, even from the earliest ages, to be the surest glory and defence. The influence of a state so fortunate has always been most widely and efficiently felt; and its power, whether for good or evil, has always been proportionally increased.

Before concluding, we should observe that it was customary, in ancient times to give an appellation to a vessel, according to the place from whence it started, or according to the purpose to which it was intended to be applied. Thus, Phaselus, a small yacht, pinnace, or pleasure-vessel, was named, in all probability, from Phaselis, a town in Pamphylia, belonging to the Cilicians, where such boats were much in use:—Cydarus, a vessel peculiar to a river in Thrace, of the same name:—Parones, which were small vessels built on the Parian Islands, in the Ægean Sea, the inhabitants of which were much accustomed to use those vessels:—Myoparones, nearly of the same description with those last mentioned, and acquiring their title from the same cause, with the addition of the term Myon, a city in Epirus, where the use of them was much adopted. Cicero states that the name Cybea was applied to a large vessel built for the purposes of merchandise, and so called from the word "cibus," which is the Latin for meat or food. The term Gaulus, was applied to vessels nearly round, somewhat resembling the present jolly-boat, which term was probably derived from the same Latin word, which signifies a *milk-pail*:—the term Corbitæ was applied to such vessels as Cæsar saw when he invaded Britain,—which we have already seen (p. 34) were made of wicker-work,—the word "corbis" signifying a wicker-basket:—Caudicæ, was a term applied to rafts, and was derived from "caudex," the stump or body of a tree:—Hippagines, from *hippos*, a horse, was applied to vessels employed for the transportation of cavalry or horses:—Pontones,—from which is derived the word *pontoons*,—was the term applied to such vessels as were adapted to the passage of rivers. Many others might be enumerated.

The naval art had advanced no further when the Gothic irruptions into the southern climes of Europe, and consequent downfall of the Roman empire, threw Navigation, with all the other arts and sciences, back into their original barbarism. They flourished, however, in another part of the world, whither we must attend their footsteps,—at least when they seek the sea,—and hail their restoration in Europe. But here may properly be drawn the line, which bounds the ancient naval art and practice from that of subsequent times; and the crossing of this line will be the commencement of a dissertation on the navigation of the Middle ages.

THE WATCH-TOWER, OR LIGHT-HOUSE, ERECTED BY PTOLEMY SOTER, ON THE ISLE OF PHAROS, NEAR ALEXANDRIA.—ABOUT 300 B.C.

This was a large building, composed of fine white marble, one hundred and thirty-five feet high, on the top of which fires were constantly maintained, for the direction of ships upon the coast. The expense of this tower was about eight hundred Alexandrian talents, or about 330,000*l*. English. The Isle of Pharos was in the bay of Alexandria, about seven furlongs from the continent, and was joined thereto by a causeway. The tower was accounted one of the seven wonders of the world. The architect, Sostratus, was ordered to inscribe on it, "King Ptolemy, to the gods, the saviours, for the benefit of sailors:" but, wishing to claim all the glory, he engraved his own name on the solid marble, which he covered with cement, on which he formed Ptolemy's inscription. When the cement had decayed by time, Ptolemy's name disappeared, and the following inscription then became visible;—"Sostratus, the Cnidian, son of Dexiphanes, to the gods, the saviours, for the benefit of sailors." Dexiphanes, was he who made the causeway mentioned above. This light-house is alluded to in our last paper, see page 40.

THE WATCH TOWER OF PHAROS.

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CAISTER CASTLE, NORFOLK.

RUINS OF CAISTER CASTLE.

THE ruins of Caister Castle, in Norfolk, offer much that is interesting, both intrinsically and historically, to the notice of the antiquarian;—intrinsically, as being the remains of one of the earliest brick buildings in the kingdom; and historically, as being founded by the celebrated Sir John Fastolf, as having been an object of contention between various of the highest families in the county, and as being associated with many of the principal events, as well as personages, in the annals of our country. It is situated about three miles to the north of Great Yarmouth, and about a mile from the coast.

As early as 1363, we obtain notice of the manor of Caister being in the possession of the Fastolf family; but the first mention of erecting any residence appears in the reign of Henry the Fifth, who granted Sir John Fastolf a license "to build it as strong as himself could devise," and appointed it as a fortification to the town of Great Yarmouth. The castle, or "hall," as it is termed by contemporary writers, enclosed a court, in form a rectangled parallelogram, whose north and south sides were longer than the east and west. At the north-west corner is the tower of which we annex an illustration. The grand entrance was over a drawbridge on the west side.

And here it will be as well to introduce Sir John Fastolf to the reader under his real character; since he it is, who in exchange for his own fair celebrity, is indebted to Shakspeare for a notoriety, which clings, with more tenacity than justice, to his name. This hero was born at Yarmouth about, or shortly before, 1380, and, his father dying early, he became, according to the custom of the times, the ward of a nobleman and was trained up in the family of the

Duke of Norfolk, whose splendid and numerous retinue appears to have been the polite school of all the squirearchy around. About 1405-6 he appears in Ireland with Thomas of Lancaster, second son to Henry the Fourth, afterwards Duke of Clarence, and then lord-lieutenant of that country. Two years afterwards he married, in Ireland, Milicentia, daughter of Sir Robert Tibelot, and widow of Sir Stephen Scroope, with whom he received a large fortune; and shortly after, obtaining posts of considerable trust in Gascony, he went thither to reside. Here he remained, engaged in all the commotions, civil and military, which mark this period, when England was endeavouring to establish her claims to the possession of France. In 1415 we find him, in conjunction with the Duke of Dorset, intrusted with the government of Harfleur, and subsequently present with Henry the Fifth at the battle of Agincourt, on which occasion he especially distinguished himself. After the death of this young monarch he continued to be promoted to posts of higher importance and honour, and to distinguish himself by such services of bravery and danger, as, in 1425, procured him the order of the Garter. In 1428 he gained great honour at the memorable battle of the Herrings, in which, at the head of 2500 Englishmen, he totally routed 4000, or, as some of the French historians admit, 9000 of the French, and succeeded in conducting a convoy of provisions, (consisting chiefly of herrings,) in triumph to the English camp before Orléans.

The character of this brave warrior, however, here suffers a partial eclipse, for we find him sharing in the universal panic which infected the English forces, before the mysterious power of the Maid of Orléans. But with returning fortune his name resumed its lustre; and after a period of active service, he concluded his career with a succession of diplomatic and civil employments. In 1435 the Duke of Bedford, Regent of France, dying, gave a manifest proof of the esteem in which he had held Sir John, by leaving him one of his executors. In 1436 for the space of four years he appears settled in the government of Normandy; after which, in 1440, he finally returned to his native land, and abode in his different estates, but principally in his hall of Caister, where he lived in great splendour and hospitality. He died in 1459, full of years and worth, and was buried in a chapel, erected by himself, in St. Bennett's Abbey, Norfolk, the ruins of which yet remain. He had been twice married, but left no children. The greater portion of his immense fortune was bequeathed to charitable purposes, in which the universities of Oxford and Cambridge largely shared, and especially Magdalen College, Cambridge.

Much has been said to prove Shakspeare's injustice in his character of Sir John Falstaff, as represented in his *Henry the Fourth* and *Fifth*, &c.; but herein the same charge of injustice may extend to the critics themselves: for, setting aside the inaccuracy of name, and anachronism of date, it by no means appears that in the person of the unwieldy buffoon, who amuses us equally with his jests and cowardice, Shakspeare ever intended to depict the great and good Sir John Fastolf, celebrated alike in field and council, feared by his enemies, and beloved by his friends. A version more agreeable to probability and history is, that the character of Falstaff was originally written and acted under the name of Sir John Oldcastle, but, imagining it might give offence to the Oldcastle family (then living), Queen Elizabeth ordered our bard to substitute another name. Nor need it be supposed that this buffoon notoriety was more applicable to the real identity of Sir John Oldcastle, with whom, except in point of age, it no better agreed.

And now, having endeavoured to justify the character of this hero of olden time, we must also clear the history of his castle of Caister, from some errors which attach to it. One of them consists in a fallacious idea entertained by some writers, that the castle of Caister was built as a ransom by the Duke d'Alençon, taken prisoner by Sir John, at the battle of Agincourt,—a supposition which is refuted by a letter from Sir John, dated from Caister Hall, 1456, wherein he sues for the money due to him for the said ransom. Another error respects a supposed similarity between the castle of Falaise, in Normandy, the birth-place of William the Conqueror, and that of Caister; the latter being said to built on the exact model of the former; but this is easily refuted by those who have visited both, and enough remains of each to prove that no such correspondence ever existed. The only analogy between them consists in a solid tower, and other apartments, having been added to Falaise about the period of the erection of Caister, by the famous Talbot, Earl of Shrewsbury, contemporary, and companion in arms, with our Sir John Fastolf.

Much light has been thrown on the history of this castle, and the families connected with it, by *The Paston Letters* edited by Sir John Fen; a collection of the most valuable private correspondence during the eventful period included between the reigns of Henry the Fourth and Henry the Seventh.

From this correspondence we find Sir John living in great splendour, keeping up a large body of retainers, engaged in active charity, and in plans for testamentary benefactions, but nevertheless adding yearly to his estates, and administering, and exacting justice in a manner which shows the stern old disciplinarian, as well as the kind friend and master. These were the prosperous days of old Caister; for Sir John's death, while it enriched many excellent public institutions, and diffused much private comfort, gave rise to that usual average of evil, which, four hundred years ago, accompanied the best intentions and deeds, much the same as it does at the present day. His ample estates were chiefly vested in charitable endowments, while that of Caister was left to his cousin, John Paston, Esq., on condition of his maintaining with the profits therefrom, a "college," or rather chapel for seven priests, and seven poor men,—a foundation which the knight had laboured to obtain during his life-time, and which it appears the Pastons succeeded in establishing, though not till after the lapse of many years, and innumerable difficulties in obtaining the necessary grant.

To detail and elucidate the various plots, open and secret, to dispossess the Pastons of their rightful inheritance—how kings and commons played into one another's hands, and used or abused the law as their interests required, and how all this occurred at a time when the kingdom was torn with civil wars, and the faction of York and Lancaster alternately ascendant, is no easy task. The Duke of Norfolk, then a prince of almost unlimited power, and chiefly resident at his castle of Framlingham, in Suffolk, had, it appears, for some time kept a longing eye upon the fair estate of Caister, and shortly before Sir John Fastolf's death, we find Agnes Paston, widow of Sir William Paston, judge, thus writing to John Paston her son,—

It is said in this country, that my lord of Norfolk saith, Sir John Fastolf hath given him Caister, and that he will have it plainly.

This same John Paston, therefore, a man it appears universally respected, inherited with Caister, a weight

and succession of cares, which left him no rest to mind or body. His affectionate wife writes to him,—

And, at the reverence of God, sloth not your matters now, but make an end to them; either purvey you to make or mar them in haste, for this is too horrible a cost and trouble that ye have and have had, for to endure any while; and it is great heaviness to your friends, and great joy and comfort to your enemies. My lord of Norwich (the Bishop of Norwich,) said to me, that he would not abide the sorrow and trouble that you have abiden, to win all Sir John Fastolf's goods —God be your speed.

Through the machinations of powerful enemies John Paston was soon thrown into the Fleet, and though soon liberated, he died, worn out with care, after seven years of precarious possession. Caister then descended to his son, Sir John Paston, a soldier and knight, and quite a gallant of his time, who was principally stationed at Calais, but who, however, set great store by his estate at Caister.

About this time, 1468, Thomas Howys openly and unwarrantably proffered to sell the estates of Caister to the Duke of Norfolk, making, on that occasion, most insulting mention of a "pretended bargain, by which John Paston, in his lifetime, thought to have secured all my Master Fastolf's land in Norfolk and Suffolk," Fortified by this nominal and illegal purchase, the duke soon resorted to opener means. At the same time Fastolf of Longshawe, a relation of the late knight's, threatened largely to attack the place, though it does not appear that he ever proceeded to such extremities; and a report went abroad, that Richard, the infamous Duke of Gloucester, also intended possessing himself of Caister. At length, in 1469, the duke threw off all disguise, and openly summoned "John Paston, with his fellowship," to quit Caister at fifteen days' notice. Caister was meanwhile occupied by John Paston the younger, a brother, though of the same name, to Sir John Paston, then at Calais, and he, determined to defend the place, thus writes to his brother;—

And how that my demeaning shall be it is too late to send to you for advice, wherefore, if I do well I ask no thank, and if I do ill, I pray you lay the default on over little wit; but I purpose to use the first point of hawking, to hold fast if I may.

And hold fast he certainly did, with his little garrison of twenty-eight against a regular siege of 3000 troops, headed by Sir John Heveningham, and joined by many persons of distinction. Whilst the utmost was thus doing to defend the place from within, Sir John Paston was equally indefatigable without. We find him immediately proceeding to lay the matter before the king's council then at York, and moving in his behalf such personages as the Duke of Clarence, the Archbishops of Canterbury and York, the Earl of Essex, &c. Meanwhile the siege commenced.

Whatever the decision of the king's council might be, it would seem that my Lord of Norfolk had no great respect for it, and the siege continuing, we are presented with some interesting letters from Margaret Paston to her son, Sir John, written with all a woman's and mother's anxiety, wherein she gives him report of the death of his friends, the danger and hardships of the survivors, the destruction of the place, and the increasing virulence of the duke. Urged by these and other considerations, and by the delays of his powerful friends, Sir John desires Writtill to ascertain the precise state of the besieged, and though equally anxious to preserve his patrimony, to keep or yield it accordingly. The matter winds up in a short letter from John Paston the younger, headed, "Caister yielded," acquainting his brother with the bravery of his servants, and of the urgent necessity which compelled them to the deliverance of the place, saying, "We were sore lack of victuals and gunpowder; men's hearts, lack of surety of rescue, were driven thereto to take appointment." The siege of Caister lasted about three weeks, and was concluded at the end of September, 1469.

In disputes of this kind, it seems that with the cause of contention, all animosity also ceased; for, after clearing off a few troublesome accounts still remaining between them, we find John Paston the younger resuming service with the Duke of Norfolk, in whose household he had been reared.

The Pastons continued suing in vain for justice through various channels, and spending their substance in the necessary bribes accompanying such applications, when a catastrophe occurred which turned the scale in their favour. This was no less than the awfully sudden death of the Duke of Norfolk, in January, 1475, then a young man of thirty-four years of age.

He left an only daughter, the Lady Anne, sole heiress of his immense possessions, who, in 1477, was married to Richard Duke of York, second son of King Edward the Fourth, she being at that time five years, and he, three years of age, on which occasion he was created Duke of Norfolk. The little duchess, however, died, we believe, before the innocent prince, her nominal husband, who was murdered with his brother in the Tower, 1483. After which, the estates and title of Norfolk came to Sir John Howard, whose mother was aunt to the late duke, and with the Howards it has ever since remained, being a period of eleven generations.

This infantine marriage seems not to have produced the unfavourable result which the Pastons prognosticated, for in June, 1476, Sir John writes, "Blessed be God, I have Caister at my will; God hold it better than it has done before;" on the back of which letter is written, "Caister is gotten agayn," and in the July following, King Edward granted him a warrant under his own hand and privy seal, to take possession of all lands belonging to his late father, &c.

Shortly after this, considerable damage was done to the castle by a girl setting fire to it in making a bed. Sir John dying unmarried in 1479, all the Paston property descended to the same John Paston the younger, who retired to the halls of Caister which he had so valiantly defended. In 1485, he was High Sheriff of Norfolk and Suffolk; in 1487 was knighted, and made knight banneret at the battle of Stoke, by Henry the Seventh, and died in 1503. Caister continued the chief and favourite seat of the Pastons, till Clement Paston, grandson of the last-named, and a great naval commander, built a magnificent hall at Oxnead, in Norfolk, whereupon the residence of Caister gradually fell into decay. The Paston family continued to increase in wealth and importance, intermarried with the first families in the county and kingdom, were created baronets in 1641, and Earls of Yarmouth and Barons Paston in 1679. With the second of that title, who died in 1732, this noble family became extinct in the male line. This earl had greatly encumbered the estates, and at his death they were purchased by Lord Anson, the great circumnavigator.

The village of Caister is also famous as having been the site of a *castra æstiva*, or summer station of the Romans, (see our article on Burgh Castle, vol. xi., p. 177,) from which the place derives its name.

Speak only when you have anything to say which it is desirable to communicate. You do not know what a great gift of God it is, not to be obliged to speak, and to know when to hold your tongue.—St. Gregory; *Book of the Fathers.*

RECREATIONS IN NATURAL PHILOSOPHY.

WE propose, under the above title, to present our readers with a series of very popular papers, on various subjects connected with natural philosophy. As our object is to present the young reader with an easy and agreeable mode of passing his time, and of turning it to useful account, even in the midst of his sports, we shall avoid every appearance of scientific difficulty, which may remind him of work instead of play. Accordingly, we shall adopt no particular arrangement of subjects, but write, from time to time, on such as most readily occur to us; and which we think capable of being best understood, or most likely to afford pleasure. Our experiments will be of such a nature as to be easily repeated, without having recourse to that very expensive gentleman, the philosophical instrument maker. We therefore begin by requesting the young experimentalist to provide himself with some of that cheap and abundant blessing—water—for we are going to talk to him of

I. THE SIPHON.

MOST persons who inhabit a city or large town, such as London, have seen a distiller's wagon in the streets, with men drawing off spirits from casks into copper vessels, through bent copper tubes; most persons, we say, have seen this; but very few understand the curious law by which fluids admit of being removed from one vessel into another in this way. If we look at the manner in which it is done, we find that the pipe ascends from the upper part of the cask; and is not inserted into the lower part; and, in that respect, differs from all our common notions as to the manner in which liquids move.

Why is it that the water will not flow out of a tea-kettle while on the fire, into our tea-pots, unless, by applying our hand to the handle, we bring the spout of the kettle to a lower level? It is that water, under general circumstances, will not ascend, but will constantly strive to attain a lower position. The tinman, therefore, who, without being much of a philosopher, perfectly well knows that such is the property of liquids, makes the mouth of the spout of the kettle higher than the body of the kettle, in order that, although full of water, it may not overflow. The manner in which cocks are fixed into our cisterns and water-butts, the care which we take to prevent any holes being made in the sides of a vessel containing water, &c., all show that we constantly act from a knowledge of the circumstance, that water will descend whenever an opportunity for so doing occurs; but that it shows no tendency to ascend. How is it, then, that the distiller is enabled to draw liquor from a cask by a pipe fixed into the top of the cask instead of into the bottom? This we will now answer.

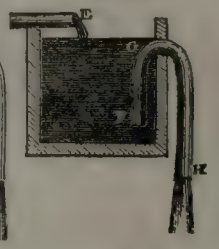
The air which we breathe, and by which we are always surrounded, is a material substance, although we cannot see it. A gallon of it weighs about a quarter of an ounce, and presses on other bodies in that proportion. A milkmaid, while carrying her pail upon her head, when going to milk cows, thinks that she has an empty pail upon her head, and only bears the weight of the pail: but such is not the case; she carries a pailful of air besides the pail itself, the air weighing from an ounce to two ounces. It is very true that this is a small amount of weight; but it produces an important effect when witnessed in the grand processes of nature. The atmosphere is about fifty miles in height from the earth's surface; but it gets so much thinner or lighter as we ascend, that if the whole were of the same density as at the earth's surface, a mass of air only five miles high would weigh as much as that of the whole fifty miles now does, as it is really constituted.

Now this weight acts as a pressure upon all bodies at the earth's surface; and it is precisely this pressure which makes water ascend in the siphon or bent tube of the distiller. The shorter leg of the siphon is, in the first intance, inserted into the bung-hole of the cask, the other end being closed by means of a cock. A small tube is inserted at the side of the siphon above the cock, and passes a little way into it. To the free end of this small tube the man applies his lips, and sucks out the air, the spirit in the cask being pressed upon by the atmospheric air, a portion of it rises up the tube, passes over the bent part, and falls down to the closed end of the siphon; on opening the cock the spirit flows out, and the cask would be almost entirely emptied of spirit, unless the flow were regulated by the turning of the cock at the long end of the siphon.

Let us illustrate this by a figure. The annexed cut represents a vessel, with a siphon F G H inserted

Fig. 1.

Fig. 2.



in one side of it. In fig. 1 the vessel is rather more than half filled with water, and in fig. 2 it is nearly full. The pipe E we will supose to be for the purpose of conveying water into the vessel. Now as soon as there is enough water in the vessel to reach up to the point F, that is, to the mouth of the siphon, the water begins to ascend the tube; and if the vessel gets so full that the water is as high as the top of the siphon, as in fig. 2, it will immediately begin to flow down the outer leg of the siphon, and escape at the end H; but so long as the height of the water is, as in fig. 1, less than the height of the siphon, the water will not flow through the tube, provided the bent part of the siphon contain air; because that air will act on the water in the inner leg of the siphon, as much as the exterior air acts on the water in the vessel, and will prevent it from flowing outwards. But if the siphon, before it be introduced into the vessel, be inverted and filled with water, the water from the vessel will flow through the siphon, even if there were only just enough water to cover the mouth of the siphon at F. If the conduit pipes F and E be of the same bore, that is, of the same breadth or diameter, as the siphons, the water will flow out as quickly as it flows in. If the conduit-pipe be of larger bore than the siphon, the latter will not draw off the water quick enough, and the vessel will soon overflow. If the conduit-pipe be of smaller bore than the siphon, the vessel will be emptied down to F; air will then enter the siphon, and no more water will flow from it until the level of the water in the vessel and in the siphon has reached to G. All these conditions, however, are subject to modifications depending upon the rapidity with which the water flows into the cistern from the conduit-pipes.

We now understand the action of the distiller's siphon. The inner leg of the siphon dips into the liquid in the cask; and the air which presses on the liquid in the cask forces it up the siphon, because the latter, being full of liquid, cannot allow the air

to press in an opposite direction. It must always be understood, however, that the mouth of the outer leg of the siphon must be at a lower level than the surface of the liquid in the vessel, or the liquid will not flow through the siphon.

This property of water is the source of one of the grandest, as well as one of the most valuable, phenomena of nature: we mean the formation of springs and fountains. The rain which descends from the clouds, falls, some on hilly districts, and other portions on plains and valleys. That which falls on hills is partially absorbed by the soil, and a number of minute streams combine to form a reservoir, which frequently exists in the bosom of a mountain. From this reservoir streams descend through the sandy strata, following the windings of those kinds of soil, or earth, or gravel, which will admit them to pass most easily. These little streams may thus descend and wind, until they arrive under the surface of a neighbouring valley: when, if the soil above them be porous, they will rise to the surface and exhibit themselves to us under the form of bubbling streams. The reason why the water rises to the surface is, that all the little channels leading from the reservoir to the spring, form collectively a sort of siphon turned upside down, because there is a continuous stream of water from one end of the siphon to the other.

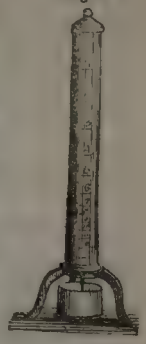
If the soil on the surface of the valley lie on a chalky foundation, the little streams will probably be unable to penetrate upwards through the chalk; but if a well be dug at that part, a hole or passage is prepared for the water, through which it will ascend. If the reservoir in the neighbouring mountain be under the level of the valley, the stream will form a well; but if it be at a higher level, the stream will form a fountain, because the water will strive to reach as high a level at the valley as at the mountain.

The poet Thomson, in some beautiful lines, thus describes the above phenomenon:—

> These roving mists, that constant now begin
> To smoke along the hilly country; these,
> With weightier rains and melted Alpine snows,
> The mountain-cisterns fill, those ample stores
> Of water, scooped among the hollow rocks,
> Whence gush the streams, the ceaseless fountains play,
> And their unfailing wealth the rivers draw.
> Some sages say, that, where the numerous wave
> For ever lashes the resounding shore,
> Drilled through the sandy stratum, every way
> The waters with the sandy stratum rise;
> Amid whose angles infinitely strained,
> They joyful leave their jaggy salts behind,
> And clear and sweeter as they soak along:
> Nor stops the restless fluid; mounting still,
> Though oft amidst the irriguous vale it springs;
> But to the mountain courted by the sand,
> That leads it darkling on in faithful maze,
> Far from the parent-main, it boils again
> Fresh into day; and all the glittering hill
> Is bright with spouting rills.

The property which enables liquids to flow from one vessel into another through a siphon, was taken advantage of to form a rude kind of clock, before our present admirable watches and clocks were invented. To explain how this was done, we must first consider another mode of attaining the same object. Fig. 3, is a Clepsydra, or Water-Clock. It consists of an upright hollow tube, with a little hole in the bottom, and an open vessel placed underneath. The hole in the bottom of the tube is so small, that the tube-full of water takes twelve hours to flow out. The tube is filled with water at a certain hour, and when the water has all flowed out, it indicates that twelve hours, or half a day, have elapsed. But how shall we know when one, or two, or three hours have elapsed? If the water flowed through the hole with a constant rapidity, it would be sufficient to divide the height of the tube into twelve equal parts; and we should know that when one of those divisions was emptied, one hour had elapsed; when two divisions were emptied, two hours had elapsed, and so on. But such is not the case: the water flows more rapidly when the tube is nearly full than when it is nearly empty; indeed, so great is the difference, that if the tube were twelve inches high, almost two inches of water would flow out in the first hour, and only one-twelfth part of an inch in the last hour

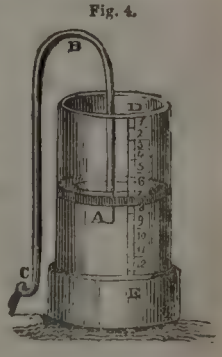
Fig. 3



It therefore became necessary, in order to make this water-clock indicate correct hourly intervals, to divide the height of the tube into twelve unequal divisions, the smallest being at the bottom, and increasing upwards in length according to a certain law of increase; this we see roughly indicated in our engraving.

But it was not always easy to graduate the tube in the exact proportion desired; and, in order to obviate the necessity of so doing, the principle of the siphon was employed, as in the annexed figure, fig. 4. Here D E is an open vessel for containing water, and A B C is a siphon, with the outer opening C at a lower level than the inner opening A. On filling the vessel with water, and immersing the shorter leg of the siphon in it, the water will flow through the siphon, and escape at the lower orifice C, provided, of course, the siphon be properly prepared by being full of water before the short leg is immersed in the vessel. In this way the vessel may be completely emptied of its water

Fig. 4.



We have now to inquire whether the water flows at an equal velocity through the siphon at all times; for if such is not the case, we shall be as far off as ever from obtaining a correct time-measurer. Now such is not the case, unless the lower orifice C of the siphon is at a constant distance below the surface of the fluid in the vessel: as that distance increases, so does the rapidity of the flow through the siphon increase. In order, therefore, to keep this distance always equal, the shorter leg of the siphon is fixed through a flat piece of cork, which floats on the surface of the water; so that as the water sinks the siphon sinks with it, and the consequence is, that the water flows with a constantly equal rapidity through the siphon.

This we perceive is precisely the object which we desired: the vessel loses equal portions of water in equal times. If, therefore, the height of the vessel be divided into twelve equal parts, either one of the divisions will be emptied of its water in an hour; for the diameter of the siphon, and the size of the vessel, are so adjusted, as to cause the whole of the water to flow out in twelve hours. If the vessel is filled with water at noon, one-twelfth will have flowed out by one o'clock, and the surface will be at 1, as in the figure. We have represented the cork-float at between the levels of 7 and 8; it is thus indicated that nearly two-thirds of the water have flowed out, and that nearly two-thirds of twelve hours have elapsed in the flowing, which indicates likewise that the time is now between seven and eight o'clock.

These are some of the means by which our forefathers measured the flight of time; but the almost magical performance of a modern watch or clock has completely driven the water-clock out of the field; and it is only now known as a curiosity—as a relic of ancient ingenuity.

The reader may see the action of the siphon by taking a bent tube and placing one end into a vessel of water, and inserting the other end into his mouth; on withdrawing the air the water will pass over the bent part of the tube into his mouth, and if the latter be removed, the water will continue to flow until the vessel is empty, provided the outer end of the tube be always below the level of the water in the vessel.

THE HEAD OF THE ELEPHANT.

A VULGAR admiration is excited by seeing the spider-monkey pick up a straw or a piece of wood, with its tail; or the elephant searching the keeper's pocket with his trunk. Now, fully to examine the peculiarity of the elephant's structure, that is to say, from its huge mass to deduce the necessity for its trunk, would lead us through a train of very curious observations to a more correct notion of that appendage, and therefore to truer admiration of it.

We find that one of the grinders of the elephant weighs seventeen pounds; and of these there are four in the skull, besides the rudiments of others. We next observe how admirably these grinding-teeth are suited to sustain great pressure and attrition. The jaws must be provided to give deep socketing to such teeth: and they must have space and strength to give lodgment and attachment to muscles sufficient for moving this grinding-machine. The animal must have its defence too. Now each of the tusks sometimes weighs as much as one hundred and thirteen pounds: and being projected, they may be considered as if placed at the end of a lever. If this enormous and heavy head had hung on the end of a neck having anything like the proportion in its length, which we see, for example, in the horse, it would inordinately have increased the pressure on the anterior extremities; and more than four times the expenditure of muscular power would have been necessary to the motion of the head. What has been the resource of nature?

There are seven vertebræ of the neck in this animal, the same number that we find in the giraffe; but they are compressed in a very remarkable manner, so as to bring the head close upon the body: and thus the head is, as it were, a part of the body, without the interposition of the neck. But the animal must feed: and as its head cannot reach the ground, it must possess an instrument like a hand in the proboscis, to minister to the mouth, to grasp the herbage, and lift it to its lips. Thus we perceive that the form of the elephant, as far as regards the peculiar character in the shoulders and head, the closeness of the head to the body, the possession of the proboscis, and the defence of that proboscis by the projecting tusks, is a necessary consequence of the weight of the head, and, indeed, of the great size of the animal.—BELL *on the Hand.*

MORNING SOUNDS.

BUT who the melodies of morn can tell?
The wild brook babbling down the mountain's side;
The lowing herd; the sheepfold's simple bell;
The pipe of early shepherd, dim descried
In the lone valley; echoing far and wide
The clamorous horn along the cliffs above;
The hollow murmur of the ocean-tide;
The hum of bees; the linnet's lay of love;
And the full choir that wakes the universal grove.

The cottage curs at early pilgrims bark;
Crowned with her pail the tripping milk-maid sings;
The whistling ploughman stalks afield; and, hark!
Down the rough slope the ponderous wagon rings;
Through rustling corn the hare astonished springs;
Slow tolls the village-clock the drowsy hour;
The partridge bursts away on whirring wings;
Deep mourns the turtle in sequestered bower;
And shrill lark carols clear from her aërial tower.—

BEATTIE.

DANGERS OF MORAL SENTIMENT UNACCOMPANIED BY ACTIVE VIRTUE.

OF the various appearances of melancholy weakness in youth, none is more general or more fatal to every duty or hope of the Christian, than that, where the youthful taste is exalted above the condition in which life is to be passed. The faithful parent, or the wise instructor of the young, will ever assiduously accommodate the ideas of excellence to the actual circumstances and the probable scenes in which their future years are to be engaged; and every condition of life undoubtedly affords opportunities for the highest excellence of which our nature is susceptible. If, on the other hand, these hours are neglected,—if the fancy of youth be suffered to expand into the regions of visionary perfection,—if compositions which nourish all these chimerical opinions are permitted to hold an undue share in the studies of the young,—if, what is far more, no employment of moral labour and intellectual activity are afforded them to correct this progressive indolence, and give strength and energy to their opening minds, there is much danger that the seeds of irremediable evil are sown, and that the future harvest of life will be only feebleness, and contempt, and sorrow.

If, in the first place, it is to the common duties of life they advance, how singularly unprepared are they for their discharge! In all ranks and conditions, these duties are the same; everywhere sacred in the eyes of God and man; everywhere requiring activity, and firmness, and perseverance of mind; and everywhere only to be fulfilled by the deep sense of religious obligation. For such scenes, however, of common trial and of universal occurrence, the characters we are considering are ill prepared. Their habits have given them no energy or activity; their studies have enlightened their imaginations, but not warmed their hearts; their anticipations of action have been upon a romantic theatre, not upon the humble dust of mortal life.

It is the fine-drawn scenes of visionary distress to which they have been accustomed, not the plain circumstances of common wretchedness. It is the momentary exertions of generosity or greatness which have elevated their fancy, not the long and patient struggle of pious duty. It is before an admiring world that they have hitherto conceived themselves to act, not in solitude and obscurity, amid the wants of poverty, the exigences of disease, or the deep silence of domestic sorrow. Is it wonderful that characters of this enfeebled kind should recoil from the duties to which they are called, and which appear to them in colours so unexpected?—that they should consider the world as a gross and vulgar scene, unworthy of their interest, and its common obligations as something beneath them to perform; and that, with an affectation of proud superiority, they should wish to retire from a field in which they have the presumption to think it is fit only for vulgar minds to combat?

If these are the opinions which they form on their entrance upon the world and all its stern realities, it is the "fountain from which many waters of bitterness will flow." Youth may pass in indolence and imagination, but life must necessarily be active; and what must be the probable character of that life which begins with disgust at the simple but inevitable duties to which it is called, it is not difficult to determine.

From hence come many classes of character with which the world presents us, in what we call its higher scenes, and which it is impossible to behold without a sentiment of pity, as well as of indignation;

in some, the perpetual affectation of sentiment, and the perpetual absence of its reality; in others, the warm admiration of goodness, and the cold and indignant performance of their own most sacred duties; in some, that childish belief of their own superior refinement, which leads them to withdraw from the common scenes of life and of business, and to distinguish themselves only by capricious opinions and fantastic manners; and in others, of a bolder spirit, the proud rejection of all the duties and decencies which belong only to common men,—the love of that distinction in vice which they feel themselves unable to attain in virtue, and the gradual but too certain advance to the last stages of guilt, of impiety, and of wretchedness. Such are sometimes the "issues" of a once promising youth! and to these degrees of folly or of guilt, let the parents and the instructors of the young ever remember, that those infant hearts may come, which have not been "kept with all diligence," and early exercised in virtuous activity.

Amid these delusions of fancy, life, meanwhile, with all its plain and serious business is passing; their contempories, in every line, are starting before them in the road of honour, of fortune, or of usefulness; and nothing is now left them but to concentrate all the vigour of their minds to recover the ground which they have lost. But if this last energy be wanting—if what they "would," they yet fail to "do," what, alas! can be the termination of the once ardent and aspiring mind, but ignominy and disgrace? a heart dissatisfied with mankind and with itself; a conscience sickening at the review of what is passed; a failing fortune; a degraded character; and, what I fear is ever the last and the most frantic refuge of selfish and disappointed ambition,—infidelity and despair.

It is ever painful to trace the history of human degradation, and it would even be injurious to religion and virtue to do it, if it were not at the same time to exhibit the means by which these evils may be prevented. Of the character which I have now attempted to illustrate, the origin may be expressed in one word: it is in the forgetfulness of duty, in the forgetfulness that every power, and advantage, and possession of our being, are only trusts committed to us for an end, not properties which we are to dispose of at pleasure; in the forgetfulness that all our imaginary virtues are "nothing worth," unless they spring from the genuine and permanent source of moral and religious obligation.

Wherever, indeed, we look around us upon general life, we may everywhere see, that nothing but the deep sense of religion can produce either consistency or virtue in human conduct. The world deceives us on one side,—our imaginations on another,—our passions upon all. Nothing could save us; nothing, with such materials, could hold together even the fabric of society, but the preservation of that deep and instinctive sense of duty, which the Father of nature hath mercifully given to direct and illuminate us in every relation of life; which is "none other" than his own voice; to which all our other powers, if they aim either at wisdom or at virtue, must be subservient; and which leads us, if we listen to it, to everything for which we were called into being, either here or hereafter.—ALISON.

GUILT, though it may attain temporal splendour, can never confer real happiness. The evil consequences of our crimes long survive their commission, and, like the ghosts of the murdered, for ever haunt the steps of the malefactor. The paths of virtue, though seldom those of worldly greatness, are always those of pleasantness and peace.—SIR WALTER SCOTT.

THE NESTS OF WASPS.

THE honeycomb of the bee is well known, and the instinct by which the insect has been taught to construct its curious dwelling, has been often commented upon. It is not so generally known that many species of wasps, who live in societies, prepare habitations for their young with a skill, little, if anything, inferior to that evinced by the bee.

The nest of the common wasp is constructed in the earth, the entrance to it is by a hole or gallery worked in, like the entrance to the burrow of a rabbit; this gallery seldom leads in a direct line to the nest, and its length is of course determined by the distance of the nest from the surface, but it appears to be never less than six inches, and seldom exceeds eighteen inches in length.

This gallery leads to a little subterranean town constructed with great regularity. It is surrounded by walls on all sides, the walls not being merely formed by the earth in which the hole is made, but by a substance somewhat resembling paper, consisting of layers, altogether about an inch and a half in thickness. (See fig. 1.) This outward envelope of the nest varies in form and size according to the species of wasp to which the nest belongs; the usual form is that of a lengthened ball, about eighteen inches long, and twelve or thirteen broad. The substance of which its covering is formed, as has already been said, more resembles paper than anything else; it is generally of an ashy-gray colour, of different shades; sometimes its surface appears as if formed of different coloured substances, applied in streaks or wavy lines, so as to have a marbled appearance. The surface of this covering is not smooth, nor does its substance appear solid, but it bears some resemblance to a number of bivalve shells cemented together with their convex sides outwards. When the structure is complete, it is provided with two door-ways, or openings, by one of which the insects enter, but they always leave the building by the other. These openings are only sufficient to allow one wasp to pass at a time, and so great is the regularity of their movements, that no confusion takes place by jostling each other, or by entering at the wrong hole. The interior of the building is occupied by several platforms of cells, placed horizontally, like the segments of a honeycomb, from which, however, they differ in many respects; they are formed of the same paper-like material as the covering of the nest. The segments of the honeycomb are composed of a double series of cells, opening on both their surfaces; the cells of the wasps are in a single series, the openings all on the under side, and the cells contain no honey or other substance, being merely intended for the reception of the eggs and young. These cells are most numerous, and Réaumur has calculated that as many as thirty thousand wasps might be produced in a nest in one year. The upper part of the cells being covered over, affords spacious platforms, on which the inhabitants move backwards and forwards. The intervals between these platforms are ornamented with numerous pillars, by which they are supported. In constructing the comb, the upper and smallest platform is first formed, the second is suspended in the air beneath it, being attached by the pillars. These pillars are formed of the same material as the rest of the structure; the platforms are also attached in some places to the sides of the nest.

If the wall of the nest is cut through its substance, it will be seen that it is formed of numerous layers, leaving small spaces between each layer; as many as sixteen of these have been counted in the covering of

Fig. 1.

SECTION OF THE NEST OF THE COMMON WASP

Fig. 2.

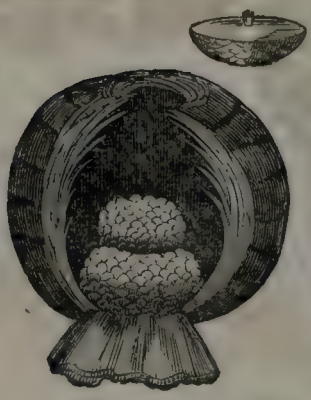
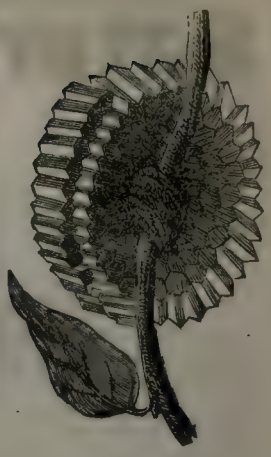


Fig. 3.

Fig. 4.



NESTS OF VARIOUS SPECIES OF WASPS.

a wasp's nest. This structure of the covering appears to be resorted to on two accounts; it requires a smaller quantity of material, and is less easily penetrated by the rain, the intervals between the layers forming so many drains for the moisture.

The material, of which the whole building is formed, is brought home by each wasp in the shape of a small ball, which is carried between a pair of pincers, placed beneath the head, with which at other times the creature divides its food. Supposing a layer begun, which the wasp wishes to enlarge, it presses the little ball, which consists of a soft paste, against one end of the layer, there it adheres, and the wasp moves backwards; as it retreats, it leaves behind it a small portion of its load fixed to the edge of the layer, employing all this time its nippers, as a potter does his finger and thumb in applying more clay to the edge of a vessel. The wasp having moulded the whole of the ball into a flattened layer, advances quickly to the place where it was first attached, and seizing it in its nippers again, retreats quickly, moulding it into a still thinner layer; this operation is repeated four or five times in succession, until it is reduced to the thickness of a sheet of paper.

Réaumur, to whom we are indebted for our knowledge of the mode in which the wasps construct their nests, was, for a length of time, notwithstanding repeated observations, unable to ascertain from what source the insects obtained the substance which they brought home with them. At length accident gave him an opportunity of ascertaining the fact; and he thus explains the circumstance.

After I had discontinued my observations on this description of fly, a female wasp, of the species of which we are speaking, taught me that which I had been so long searching for without success. She placed herself near me on the frame-work of the window, which was open. I perceived that she remained at rest, on a spot from which it seemed impossible she could obtain any succulent substance; while the rest of her body was at rest, I remarked many movements of her head. My first idea was, that the wasp was detaching from the wood some substance with which to build, and I was right in my conjecture. I observed it with attention, and I noticed that while it appeared to be biting the wood, it moved its two teeth with great activity, and cut off extremely fine fibres from the wood. The wasp did not swallow what it removed, but added it to a small mass of the same material, which it had already collected between its legs. Presently it changed its place, but still continued to gnaw the wood, and add to its little stock. Being perfectly satisfied of the nature of its labour, I seized the wasp in the midst of its work. I found it loaded with nearly as much material as these flies are usually in the habit of carrying home to their nest, but it had not yet been formed into the shape of a ball: the substance was not as moist as it is when the insect employs it in its labours.

On examining the mass, he found it to consist of numerous small *fibres* of wood, not *chips*, the insect having first loosened the fibres, and then bitten them off of the necessary length. Fragments of wood, like saw-dust, would not have answered the purpose of the wasp, they would not have interlaced so as to form a paper.

Subsequent observations proved to our author, that these insects were quite as well satisfied to take the fibres from ready-made paper, as to be at the trouble of stripping them from the wood. This he discovered by the noise made by a wasp while robbing the paper squares of a casement in Paris, near which he was at work. The window overlooked the garden, and the paper was much damaged by the numerous wasps who visited the spot.

The hornet, like the wasp, builds its nest in the ground, but other species of this genus attach them to the branches of trees. The engravings, figs. 2 and 3, represent specimens of these nests.

Fig. 2 was about the size and form of a large cabbage-rose. In this instance the cells were arranged in two masses, at the bottom of the cavity of the nest. Fig. 3 shows the form of a wasp's nest from America; the outside of this nest was smooth, and bore a great resemblance to pasteboard. Fig. 4 is a very singular wasp's nest; the cells are unprovided with the usual covering, and attached to the branch of a tree; at a little distance it appears like a flower. Unprovided with the usual covering, these wasps preserve their cells from the effects of the rain by varnishing them, and this seems to occupy a great portion of their time.

As beauty does not consist in taking what lies immediately before you, so neither, in our pursuit of taste, are those opinions which we first received and adopted, the best choice or the most natural to the mind and imagination. In the infancy of our knowledge we seize with greediness the goodness that is within our reach; it is by after consideration, and in consequence of discipline, that we refuse the present for a greater good at a distance. The nobility or elevation of all arts, like the excellency of virtue itself, consists in adopting this enlarged and comprehensive idea, and all criticism built upon the confined view of what is natural, may properly be called *shallow* criticism, rather than false; its defect is, that the truth is not sufficiently extensive.—SIR JOSHUA REYNOLDS.

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THE BERNESE OBERLAND.

JUNGFRAU AND WENGEN ALPS.

THE Canton of Berne, though not one of the three great founders of Swiss independence, is the second in rank in the Helvetic confederation, and by far the first in size, wealth, and power. It comprises within its northern and western boundary part of the Jura, and in its southern and eastern some of the most remarkable of the Alpine chain, the intermediate space consisting of pastoral lowlands, a region of surpassing beauty, which is, however, nearly overlooked in contemplating the stupendous magnificence of the surrounding objects. That part of the High Alps which is included in the Canton of Berne, is usually known by the name of the Oberland, or Highland, of Berne, and of this we propose to give some account.

The Bernese Oberland, then, consists principally of four great valleys, the waters of which are emptied into the common basin of the lake of Thun. The most western, and perhaps the least remarkable of these valleys, is the Simmenthal, which separates the chain of the Stokhorn from that of the Niesen. The second, parallel to the Simmenthal, is the Kanduthal, which rises at the foot of the Gemmi-pass in the Valais. These two valleys pour their united waters into the western side of the lake of Thun, where they form a landscape of meadows of the richest verdure, interspersed with the most picturesque villages. The two other valleys empty themselves into the eastern corner of the lake, and of these, and the surrounding mountains, the Oberland properly consists. The principal of them is the valley of Hasli, which follows the course of the Aar from its source, the other consists of the united valleys of Grindelwald and Lauterbrunnen. Nowhere has nature displayed more magnificence than in this extraordinary region; nowhere can so constant a succession of rock, waterfall, or glacier, be found: the mind, hurried on from one wonder to another, is at first lost in a breathless enchantment, and it requires a continued residence among them to be able to appreciate them thoroughly.

The grand features of these valleys are the mighty granite mountains which encompass them; of which the most remarkable are the following:—

	Feet.
The Finster Aar horn (Dark Horn of the Aar)	14,300
— Jungfrau (Virgin)	13,600
— Eiger	12,900
— Wetterhorn (Peak of Thunder)	12,000
— Schreckhorn (Peak of Terror)	13,200

Besides which, there are many but little inferior in height or sublimity.

The valley of Lauterbrunnen, with its celebrated cascade, the Staubbach, has been already described in the *Saturday Magazine*, Vol. VII., p. 162, we will, therefore, proceed to the valley of Grindelwald, which, though of a somewhat different character, offers even greater beauties and wonders to the traveller. The usual access to it is by the valley of Lütschenen, but the route from Lauterbrunnen by the Wengern Alp, is much the most alluring to the lover of the sublime. The Wengern Alp is opposite to the Staubbach, and it requires two hours' hard labour to attain its summit, but when the atmosphere is clear, the prospect would well repay much greater exertion. For immediately opposite to the spectator rise the three enormous masses of the Jungfrau, Moneh, and Eiger, (the most imposing of the three,) covered with eternal ice, and apparently within his grasp, while the ear is struck with the frequent thunder of the distant avalanche. The effect of an avalanche is much greater to the ear than to the eye, as should the eye happen to catch it, the appearance (unless it is very near indeed,) is precisely that of falling water, whereas the sound, reverberated from a thousand rocks and caverns, is wonderfully awful and sublime.

Till lately, the Jungfrau was thought to be inaccessible, but in 1828, after several ineffectual attempts, a party of Grindelwald chamois-hunters succeeded in attaining the summit, with considerable difficulty and danger. They described the area of the summit as about thirty or forty feet in diameter, and the vast glacier, or rather plain of ice, which reaches from the Bernese Mountains to those of the Valais, as much more extensive than was supposed before. This tremendous phenomenon, must be twenty-five miles in length, by from three to twelve broad.

From the Wengern Alp to Grindelwald, the descent is over the Little Scheideck, on which may be observed the terrible effect of a glacier which fell about twelve years ago. It has been thought that forests were a complete protection against the progress of glaciers, but in the present instance the trees were entirely swept away before the moving mass, while in those parts where it did not touch, the mountain-side is still covered with magnificent pines.

The principal objects of curiosity at Grindelwald are the glaciers, which are well worthy of a visit, and, indeed, are more easily attained than any other in Switzerland. The finest and most delicate turf reaches nearly up to the ice, and wild strawberries and flowers may be gathered within a few yards of it. The principal branch of the Lütchine issues from a natural arch of ice at the foot of the glacier Inférieur, supplied by the constant melting of the ice above. The whole of this glacier is covered with pinnacles thirty or forty feet high, and is intersected with cracks and chasms, from which, in the year 1790, a fatal catastrophe occurred.

A Monsieur Monson, a pastor of the Pays de Vaud, visited the glacier with his guide, and having passed the lower part of it, proceeded to traverse the Mer de Glace. Having placed his "alpenstock" on the edge of one of the cracks, he leaned on it to contemplate the profound abyss, when suddenly the point of the staff slipped from under him, and he fell headlong into the gulf. The body was eventually recovered from the depth of 770 feet, so that consciousness must have ceased long before the unfortunate man reached the bottom.

There are many peculiar usages of the inhabitants of the valley of Grindelwald, of which some account shall be given in a future paper.

THE DUTCH WHALE FISHERY.

THE Whale fishery in Holland dates from the ninth century; and even earlier than that it seems to have been engaged in by the Norwegians. The Flemings of the eleventh, and the Icelanders and Normans of the twelfth century, also took part in it; but no authentic accounts remain of the manner in which it was conducted in those remote times. We know not even how the whales were killed; though we may conjecture that the practice in this respect may have resembled that of the Esquimaux and Aleoutians of the present day. Probably no certain mode of procedure was followed; but whales were attacked and destroyed like beasts of prey by the readiest means that circumstances at the moment might suggest.

The inhabitants of the coasts of the Bay of Biscay are said to have been the first to engage in Whale fishing as a distinct branch of commerce; and indeed, this hardly can be disputed, since so early as the twelfth century, traces of such a commerce may be discovered on those coasts. It is known also that whales used at one time to frequent the bay in great numbers, a fact which admits the supposition that capturing them might have been a great resource for the people as long as those animals remained within a moderate distance, but ceased to be so when, frightened by continual pursuit, they retired gradually northward, and sheltered themselves from the Biscayans, along the coasts of Iceland, Greenland, and Newfoundland. At the close of the fifteenth century that people, as well as the inhabitants of Rochelle, Dunkirk, and other ports, which afterwards shared their fortunes, lost this branch of industry, after having possessed it from the twelfth century.

The Northern Whale fishery commenced in the sixteenth century, and was conducted then as it has been ever since. The first enterprise seems to have been conducted by the English in 1594. About the same period the Dutch also first took part in it, and to them it has been a source of wealth almost ever since. They sent to Biscay, for harpooners, and what they called a *spek-snyder*, blubber-cutter, who was also virtually second captain, for on the ship arriving at its destination, he took the command and directed all the operations. This arrangement was a powerful element of success in the early period of these enterprises. The first expeditions were fitted out by companies chartered by the States; but in 1649, the Whale fishery was declared free, and then it rose to its most flourishing condition. Though privileged companies were at first thought requisite, in order to the surmounting of obstacles with which the fortunes of private adventurers might have struggled in vain, the time for abolishing monopolies had arrived. The original difficulties once overcome, private adventures, less cumbersome and less expensive, still further increased profits which were even then immense. The rigorous economy which distinguished them was seen chiefly in the mode of outfit. The hull of the vessel was supplied by its owner, who also took the command; a master sail-maker furnished the sails, a cooper the hogsheads, and so on. This clubbing of interests obviated the inconveniences arising from the smallness of individual capitals, and goes far to account, as a general principle, for the extraordinary rapidity with which the Dutch advanced in wealth, at a time when money was scarce, and banking operations extremely limited. When the vessel returned, each received his own share of the profits in proportion to his contribution, the sailors themselves receiving shares instead of wages. This mode of procedure increased the number of vessels employed tenfold. They amounted at

last to three hundred, manned by ten thousand seamen, sent out in one year.

About the middle of the seventeenth century, when as yet there was abundance of whales on the coasts of Spitzbergen, the Dutch built forts there, and afterwards added establishments for the preparation of oil, amply providing these with boilers and other utensils for that operation. So opulent had the whale-traders become, that a taste for luxury led them to build a town on that desolate island. Houses were actually constructed upon it within eleven degrees of the pole, fitted up with many of the conveniences enjoyed in Holland, in hopes of enabling their inhabitants to brave the rigours of the climate during all seasons of the year. These habitations were originally constructed piecemeal, in the ship-building yards of Amsterdam, and taken to Spitzbergen at a heavy cost, but the project of living there in Winter proved fatal to the lives of many. This town of theirs they called Smeerenberg, and so entirely has it now dispeared, doubtless in part from the combustible nature of its materials, that the very site it occupied can hardly be ascertained; while Batavia, founded by the same people, at the same time, on the island of Java, is now the centre of Indian trade. The idea, however, of the former of these settlements, be it remembered, was suggested, and the sacrifice of the large amount of accumulated profits which it cost, was made, only in prospect of the place becoming an inexhaustible source of wealth. It was at that time the central point of meeting for all the whaling-vessels; there they met, followed by numerous tenders, charged with victuals and stores of all kinds; so that while the fishing was in full activity, there were good inns, well-furnished shops, and many things else to make life agreeable, particularly to strangers. It was only towards the close of the seventeenth century, on the whales retiring about seventy leagues further north, that Spitzbergen was abandoned. Ham, and some other northern towns alone could compete with the Dutch, who, though they abandoned Spitzbergen, continued in possession of the trade until about the middle of the eighteenth century, when the English, after great sacrifices, got it into their own hands, and it seems not unlikely that they in turn will be supplanted by the Americans.

On retiring from Spitzbergen, the whales were still to be found in the northern parts of the icy sea, on the east coast of Greenland, but now they hardly appear even there. They confine themselves almost entirely to the sea, called Baffin's Bay, which connects with the ocean by Davis's Straits. There they are still to be found in vast numbers, but the icebergs, so formidable in those latitudes, make the fishery dangerous.

I AM by all means for encouraging the contemplation of the celestial part of the world, and the shining globes that adorn it, and especially the sun and moon, in order to raise our admiration of the stupendous power and wisdom of Him who was able to frame such immense bodies; and, notwithstanding their vast bulk, and scarce conceivable rapidity, keep them for so many ages constant both to the lines and degrees of their motion, without interfering with one another. And doubtless we ought to return thanks and praises to the Divine goodness for having so placed the sun and moon, and determined the former, or else the earth, to move in particular lines for the good of men and other animals; and how disadvantageous it would have been to the inhabitants of the earth if the luminaries had moved after a different manner. I dare not, however, affirm that the sun, moon, and other celestial bodies were made solely for the use of man; much less presume to prove one system of the world to be true and another false; because the former is better fitted to the convenience of mankind, or the other less suited, or perhaps altogether useless to that end.—BOYLE.

PRESERVATION OF APPLE-TREES.

MANY a time have I helped to cut away the branches of decaying apple-trees, and to insert healthy grafts in their places; hoping to restore the tree to the sound and fertile state in which it once had been. Revolving seasons did but tend to show that I had completely lost my time; for the American bug, supposed to have been unknown formerly, in this country, attacked my labours in such formidable array, that nothing could withstand its fury.

Every lover of the orchard must have observed this white pestilence in the enclosures sacred to Pomona. It is seen on the branches and on the bole of the apple-tree in the month of June, when it gives them the appearance of being dotted over with little patches of a downy white.

Long ago I turned my thoughts to the extermination of the spoliator, which had nearly rendered the choicest parts of the orchard a sickly, sad, unprofitable waste. I began by trying to make the branches upon which these diminutive harpies had settled, as disagreeable to them as it were possible, hoping by this manœuvre to starve them out of house and home. With this in view, I applied unctuous preparations to the injured parts of the trees; but finding, in the long run, that this availed me nothing, I made a decoction from walnut leaves, and washed the branches well with it, calculating that the bitterness of the decoction would render the favourite food of the insects unpalatable to them. But I was deceived: the bugs continued their depredations as though no pains had been taken to dislodge them.

The application of the spirit of turpentine killed them at once, and for a few days after it had been applied I was in hopes that their extermination had been effected: but others soon appeared.

Despairing of success, I was on the point of quitting the field, and leaving the bugs in undisturbed possession of it, when I began to conjecture that I had not gone the right way to work. I reflected that none of my applications could have penetrated sufficiently deep into the curved and knotty sinuosities of the diseased parts; and that, on this account, there would be a sufficient force of the enemy left alive to recommence its depredations at the first favourable opportunity. Wherefore I concluded that nothing short of the entire destruction of the eggs, the young, and the adult, could save the trees from ultimate ruin. Knowing that the bug could not exist if totally deprived of air, I resolved to bury it alive; I effected this by an application at once the most easy and simple that can be imagined. It costs nothing.

I mixed clay with water, till it was of a consistency that it could be put on the injured parts of the tree, either with a mason's trowel, or with a painter's brush. I then applied it to the diseased places of the tree, and it soon smothered every bug. A second coat upon the first filled up every crack which showed itself when the clay had become dry; and this resisted, for a sufficient length of time, the effects both of sun and rain. The sickly parts, now effectually freed from the enemy which had been preying upon their vitals, were placed in a state to be cured by the healing process of nature; and that nature has done her duty, my apple trees amply testify.—WATERTON.

WHAT a chain of evils does that man prepare for himself who is a slave to anger! He is the murderer of his own soul, yea to the letter he is so, for he lives in a continual torment. He is devoured by an inward fire, and his body partakes of his sufferings. Terror reigns around him, every one dreads lest the most innocent, the most trifling occurrence, may give him a pretext for quarrel, or rouse him into fury. A passionate man is alike odious to God and man, and is insupportable even to himself.—ST. EPHRAIM; *Book of the Fathers.*

ALL the performances of human art, at which we look with praise or wonder, are instances of the resistless force of perseverance; it is by this that the quarry becomes a pyramid, and that distant countries are united by canals. If a man was to compare the effect of a single stroke of a pickaxe, or of one impression of the spade, with the general design and last result, he would be overwhelmed by the sense of their disproportion; yet those petty operations incessantly continued, in time surmount the greatest difficulties, and mountains are levelled, and oceans bounded, by the slender force of human beings.—JOHNSON.

CHAPTERS ON CORONATIONS. No. I.

INVESTITURE OF A VASSAL KING OF PERSIA.

THE ORIGIN OF CORONATIONS.

THE ceremony of the Coronation is not to be regarded simply as a splendid spectacle, and an imposing form; it is a solemn recognition of the mutual obligations between the sovereign and the subjects, made in the presence of that Almighty Being "by whom alone kings do reign." When God selected Saul to be the first king over his chosen people, we find that "Samuel took a vial of oil, and poured it upon his head, and kissed him, and said, Is it not because the Lord hath anointed thee to be captain over his inheritance?" (1 Sam. x. 1.) From that period, the unction, or anointing with oil, became an important part of the ceremonials used at the installation of kings in Judah and Israel. St. Augustine expressly assures us that this custom was peculiar to the Jews: "Nowhere else," he says, "were kings anointed, than in that kingdom where Christ was foretold, and whence he was to come." The ceremony of Saul's inauguration was a simple recognition: "Samuel said to all the people, See ye him whom the Lord hath chosen, that there is none like him among all the people? And all the people shouted, and said, God save the king." (1 Sam. x. 24.) The ceremonies used at the coronation of David were also unction and recognition, and the forms were used when Solomon was made king, during the life-time of his father. But when Jehoash, being saved from Athaliah's massacre, was anointed king by Jehoiada, we find that several additional forms were used, which deserve attention. "Jehoiada brought forth the king's son, and put the crown upon his head, and gave him the testimony; and they made him king, and anointed him; and they clapped their hands and said, God save the king."

The crown appears to have been taken as a royal ornament, because the circle was regarded as the symbol of completeness and perfection; for the same reason, investiture by the ring was used at a much earlier period: it was by this form that Pharaoh constituted Joseph his viceroy over Egypt. A circlet for the head was used at a very early period in Persia, and probably in Babylonia; but most of the other Asiatic nations adopted the tiara, or fillet, which was bound round the king's head, on his accession, with great solemnity. The Persian received the crown, or, perhaps, we should rather call it the royal circlet, from the hands of the Chief Mobed, or High Priest; but the kings who were vassals to the Persian monarch received this emblem of their royal dignity from the sovereign himself. In the annexed engraving we see one of those vassal princes receiving the regal circlet from the hands of the Persian monarch, who claimed for himself the title of king of kings. The queen also was crowned by the king, and not by a mobed: thus, we read in the Book of Esther, "The king loved Esther above all the women, and she obtained grace and favour in his sight, more than all the virgins; so that he set the royal crown upon her head, and made her queen instead of Vashti." (Esther ii. 17.) We learn, also, from the next verse, that the ceremony of the coronation in Persia was celebrated by a public entertainment, and by various acts of grace and favour. "The king made a great feast unto all his princes and his servants, even Esther's feast; and he made a release to the provinces, and gave gifts, according to the state of the king." (Esther ii. 18.)

The Roman title of emperor originally signified nothing more than commander of an army, and was regarded as inferior to that of king. It will be remembered that Julius Cæsar refused to accept a crown; Mark Antony, in his oration over Cæsar's body, is represented as declaring—

> You all did see that on the Lupercal,
> I thrice presented him a kingly crown,
> Which he did thrice refuse.

In the Western empire, indeed, there seems to have been no established form for the installation of the sovereign; but in the Eastern or Byzantine empire the Roman customs were intermingled with those of the Oriental nations, and the emperors received from the prætorian guards a crown and a sword, which seemed to be a tacit acknowledgment of the right claimed by the soldiers to dispose of the empire. Justin II. deprived the imperial guards of this privilege, under the pretence of giving a religious sanction to the ceremonies of the coronation; and from his time the crown, sceptre, and sword, were publicly given to the emperor by the patriarch of Constantinople, in the church of St. Sophia. The ceremony of anointing was first introduced by Andronicus the Younger, in the thirteenth century, long after it had been adopted in Western Europe; he added this form in order that the soldiers should not revive their claim to perform the coronation, because

that unction and chrism, that is, anointing with oil and ointment, could only be performed by a person of episcopal dignity. The empresses of Constantinople, like the queens of Persia, however, could only receive the crown matrimonial from the hands of the emperor.

The warlike tribes of Germany elected their kings, but they always chose one of royal blood for their sovereign. Indeed, the principles of hereditary and elective monarchy, which now appear so utterly irreconcileable, were so far from seeming inconsistent to our Saxon ancestors, that they insisted on both being united in the person of their monarch, and some traces of this apparent anomaly may be found in the present ceremonials of coronation.

ELEVATION OF AN ANCIENT GERMAN KING.

When the Germans had chosen a king, they prepared a *pavis*, or very large shield, on which they seated the new monarch; and elevating the pavis on the shoulders of the principal officers, carried their king in triumphal procession three times round the army. On these occasions, the Germans used to manifest their spirit of rude independence by playing practical jokes on their sovereign, such as shaking the pavis, and attempting to unseat him. Such barbarous sport had nearly proved fatal to Gunwald, king of Burgundy: he was thrown from the shield, as he was borne round the army a third time, and was so severely bruised that it was feared he would have expired upon the spot. This custom was introduced into England by the Saxons, and it is still preserved in the chairing of successful candidates after elections. Even the spirit of practical jesting was preserved down to the beginning of the present century: within the memory of persons still alive, it was considered rather hazardous to encounter the perils of a popular chairing at Yarmouth or at Norwich.

This custom of elevating the sovereign on a shield, was introduced into the Roman empire a little before its fall; Gordjan and Julian were thus proclaimed emperors by their soldiers, who had learned the practice during their campaigns in Germany and Gaul. This custom was also adopted in the Byzantine empire. Cantacuzenus informs us that the emperor was to be elevated on the shield at sunrise; that the fore-part of the shield was to be supported by the emperor's father, if he were alive, and if not, by his nearest male relation; and that the back part was to be borne by the patriarch of Constantinople, and the principal nobles. In this state the emperor was conveyed to the church of St. Sophia, where he was invested with the ensigns of imperial dignity.

In Navarre, the ceremony of elevating the sovereign on the shield was considered of greater importance than the coronation itself. The arms of the kingdom were painted on a shield, which was placed upon the ground in some public place; the king, led by two of the principal nobles, advanced and stepped upon the shield, when it was raised up by six stout slaves, and the monarch was borne in this fashion into the midst of the assembled multitude.

In an ancient law of Don Pelayo, one of the Gothic kings of Spain, we find the following directions for the creation of their kings: "Let the king be chosen and admitted into the metropolitan city of this kingdom, or at least into some cathedral church, and the night before he is exalted, let him watch all night in the church; and the next day, when they come to lift him up, let him step upon a shield or buckler, and the principal men there present shall raise him aloft, and when he is so elevated, the people shall cry, *Real, Real.*"

Among the Jews, the Norwegians, and the Irish, the ceremony of investing the monarch with sovereign power was performed near or at some remarkable stone pillar. Thus Abimelech was made king "by the plain of the pillar that was in Shechem." (Judges ix. 6.) Jehoash, during his coronation, "stood by a pillar, as the manner was," (2 Kings xi. 14;) and Josiah, when he restored the pure worship of Jehovah, "stood by a pillar, and made a covenant before the Lord." (2 Kings xxiii. 3.)

The Norwegians and Danes used to place twelve stone seats in the form of a circle, for the principal nobles, and one in the centre for the king. The royal stone was of great size, and was rudely shaped into the form of a seat. Three of these circles still exist in Denmark, which was anciently divided into three kingdoms: the most perfect of them is that called *Kingstolen* (the royal seat), at Leipa in Zealand; the others are at Lunden in Scania, and Viburg in Jutland.

These stone circles for the installation of kings were introduced into the Shetland Isles, the Hebrides, and the Isle of Man, by their Norwegian conquerors. They were called *Tings*, and the hill on which the stone circle in the Isle of Man was erected, is still called Tinwald Hill.

The Germans adopted this custom from the Norwegians: their *Königstuhl* is near Coblentz upon the Rhine; it consists of seven stone seats ranged in a circle, for the seven electors, and a large stone in the centre for the emperors. In Hungary, the kings took their coronation oath on a stone column. After the monarch had sworn, he mounted a spirited horse, and leaped over a mound of earth prepared for the purpose, after which he ascended the mound, and waved his sword in the form of a cross over the multitude.

The most singular ceremony connected with the stone column was that which took place at the installation of the dukes of Carinthia. A large rock near the city of St. Veit was the place where the installation was performed. On the day appointed for the celebration of the ceremonial, a peasant, who claimed the place by hereditary descent, took up his position on the top of the rock, and had below him, tethered at the base, a black cow, a black calf, and the leanest mare which could be found in the province. A little after sunrise, the duke-elect came out from the city, clad in a peasant's dress, a coarse bonnet on his head, buskins of untanned

leather on his legs, and a shepherd's crook in his hand; but though thus plainly dressed, he was attended by his senators and nobles in their richest robes. When the procession approached, the peasant called out, "Who is this that cometh hither with so much parade and magnificence?" The attendants replied, "This is the prince who claims, as rightful heir, the inheritance of the sovereignty over our good land, the province of Carinthia." The peasant then inquired, "Is he just? Doth he seek the welfare of the Carinthian peasants? Is he of free condition and noble birth? Is he worthy of honour for his past conduct, and doth he desire to win honour by future exploits? Is he obedient to the laws, and attached to the ancient usages of Carinthia? Will he be a defender of the pure and holy Catholic faith?" To this the duke's attendants replied, "Such is he, and such he will be." After a long pause, the peasant renewed the conversation by asking, "Has the lord any right to remove me from this my place?" To which question the attendants replied, "Our lord hath purchased this ground for sixty deniers, and he granteth to thee the animals thou hast with thee, the robes which he wears, and immunity of taxes for thyself and thine house." The peasant then descended from the rock, and gave the duke a slight slap in the face. The duke then mounted the rock, and brandished a sword in the form of a cross over the multitude; water was then brought to him in the crown of a peasant's cap, which he drank as a symbol both of his moderation and humility. The duke then laid aside his peasant's dress, and having received his ducal robes, went and received the sacrament in the church of St. Veit.

The stone on which the ancient monarchs of Ireland were inaugurated, was at a very early period removed to Scotland, whence it was brought to England by Edward I.: it is now fixed in the seat of the coronation-chair, and we shall describe it more particularly in a future chapter.

It only now remains to mention, that the recognition, in the German forms of coronation, was always connected with the semblance of an election, as we find from the speech made by the archbishop of Cologne, when he presented Otho, who was designated emperor during the life-time of his father, to the general assembly of the German princes: "Behold, I bring you here Otho, chosen by God, and appointed by his father, Henry our lord, and now made king by all the princes of the empire. If this election please you, do you signify the same by holding up your hands to heaven." The people consenting, he was then anointed, and invested with the imperial ensigns.

ON EMPLOYMENTS WHICH INJURE THE EYE-SIGHT

No. IV.

HABITUAL USE OF GLASSES — ADJUSTMENT OF GLASSES TO VARIOUS QUALITIES OF SIGHT — NEAR-SIGHTEDNESS — LONG-SIGHTEDNESS.

THE class of persons whose sight is affected by the habitual use of glasses, comprehends a very large number of professions, and presents to the scientific mind points of high interest, while to the general reader the subject is one of paramount importance, as it determines how far the eye is affected beneficially or otherwise by the employment of optical glasses of every description, whether it be the quizzing-glass which the tyrant Fashion imposes on her votary, the sextant of the skilful navigator, or the reflecting telescope of the profound astronomer. The convex spectacle-glasses of the flattened eye of age, and the concave lens of the too convex eye of youth, are alike subjects of import which we propose briefly to consider.

But first it is necessary to remind the reader of the problems connected with vision by which the eye takes cognizance of very distant objects, and has also a distinct appreciation of those within a few inches. It is known that a telescope, microscope, camera obscura, &c., all require to be adjusted before they can be employed, and that this adjustment must vary according as they assist the eye to view near or remote objects: hence the question how is the eye adjusted, or does it require adjustment at all? This question we will answer as fully as the present state of our knowledge of the subject extends.

In the usual state of the eye it is so adjusted, by means of a power of which we are ignorant, as to perceive clearly objects at a very great distance; that is, the crystalline lens is placed as far back as the ciliary process will allow it to go, and in that position, parallel or nearly parallel rays meet in a focus on the retina. If from the distant object we look at something less remote, say a tower a quarter of a mile distant, the crystalline lens is brought slightly forward, in order that the increased path between it and the retina may correspond with the increased divergency of the rays proceeding from the latter object.

Suppose the eye be directed successively to several objects placed at various distances, such as a hill, a tower, a house, a tree, and a man, at the respective distances of ten, five, two, one, and one-half miles. Now it is supposed by some that the healthy eye is adjusted once for all to very remote objects when it is in a state of perfect repose, and consequently that it has a clear view of these objects at different distances without a new adjustment for each. Others, again suppose that the distance between the crystalline lens and the retina is precisely proportioned to each of these distances. Suppose then that such is the case, and that we are ignorant of what these distances really are, we must be altogether unable by any act of the will to adjust the lens. It must, therefore, according to this hypothesis, be adjusted, and that with mathematical precision, by involuntary action, since, in order to get a clear view of those five objects, the lens must be at five different distances from the retina. This we think impossible.

Now the motive power of the lens, the adjusting screw in short, by which it is advanced or sent back, is thought to be the iris, which by its self-acting adjustment to light, influences the motions of the lens, with which it is connected through the medium of the ciliary apparatus, so that when the eye is transferred from the view of a near to a distant object, and *vice versâ*, the pupil undergoes a change, which in its turn effects a change in the position of the crystalline lens, as a necessary consequence. The iris is connected to nerves possessing a high degree of irritability, and it is possible that the stimulant property of light is sufficient, independently of the will, to produce the variations in its diameter, according as the light is abundant or not; but it appears that for short distances the iris has the power of voluntary adjustment, that is, when near objects are to be seen, the crystalline lens is drawn forward by a voluntary action, but we are ignorant of the extent of this voluntary power; and it remains to be shown whether the iris undergoes a change, and consequently the crystalline lens, by the stimulus of light or otherwise, when the eye is transferred from one distant object to another distant object, whose dis-

tance however from the eye is less than that of the first: it seems most likely, that by a combination of voluntary and involuntary actions, the eye is accommodated to varying distances, and that the stimulus of light falling on the iris, or retina, or both, is the main cause of the adjustment of the eye.

Let us now consider a near-sighted eye, or one in which the crystalline lens is too spherical, by which the rays are converged too soon, and cross each other before they reach the retina. Now suppose such an eye is regarding a very distant object, and that the lens is then as far back as it can go, but not far enough back, in order that the focus may attain the retina, the remedy then is, supposing the eye to be otherwise healthy, a concave lens, by means of which the convergency of the rays is delayed, and by a nice adaptation the concavity of the artificial lens may so correct the too great convexity of the crystalline lens, that the foci fall exactly on the retina. Much injury, however, is done to the eye by employing bad glasses, or such as are too concave; the rule is, select such glasses as do not diminish objects seen through them; if they do so they are too concave, and the crystalline lens is brought too near to the pupil, by which means the ciliary muscles are fatigued by too rigid contractions.

Between the age of thirty and fifty, the eyes of most persons begin to experience a remarkable change, which generally shows itself in a difficulty of reading small type or ill-printed books, particularly with candlelight. This defect of sight, which is called long-sightedness, because objects are seen best at a distance, arises from a change in the state of the crystalline lens, by which its density and refractive power, as well as its form, are altered. It frequently begins at the margin of the lens, and takes several months to go round it, and it is often accompanied by a partial separation of the laminæ, and even of the fibres of the lens.

If the human eye (as Sir David Brewster remarks,) is not managed with peculiar care at this period, the change in the condition of the lens often runs into cataract, or terminates in a derangement of fibres, which, though not indicated by white opacity, occasions imperfections of vision that are often mistaken for amaurosis and other diseases. A skilful oculist, who thoroughly understands the structure of the eye, and all its optical functions, would have no difficulty, by means of nice experiments, in detecting the very portion of the lens where this change has taken place, in determining the nature and magnitude of the change which is going on, in applying the proper remedies for stopping its progress, and in ascertaining whether it has advanced to such a state, that aid can be obtained from convex or concave lenses. In such cases, lenses are often resorted to before the crystalline lens has suffered an uniform change of figure or of density, and the use of them cannot fail to aggravate the very evils which they are intended to remedy. In diseases of the lens, where the separation of fibres is confined to small spots, and is yet of such magnitude as to give separate coloured images of a luminous object, or irregular halos of light, it is often necessary to limit the aperture of the spectacles, so as to allow the vision to be performed by the good part of the crystalline lens.—Brewster's *Optics*.

. . . . . This I hold
A secret worth its weight in gold
To those who write as I write now,
Not to mind where they go, or how,
Through ditch, through bog, o'er hedge, and stile,
Make it but worth the reader's while;
And keep a passage fair and plain
Always to bring him back again.—Churchill.

"You may run from major to minor," says Mrs. Bray in one of her letters to Dr. Southey, "and through a thousand changes, so long as you fall into the subject at last, and bring back the ear to the right key at the close."

THE USEFUL ARTS. No. XXXVII.

The Carpenter and the Joiner, *concluded*.

The first and principal tools used by both carpenter and joiner, are *saws*, of different sizes, for reducing the rough wood to the size adapted for the purpose to which it is to be applied. Small, fine-toothed saws, both long and thin blades, termed spring-saws, are used for cutting out small holes in wood, and for analogous purposes, when precision and nicety are required; these spring-saws are sometimes mounted in a frame on the same principle as that of the stone-mason's saw, formerly described but commonly, the blade of the saw, of whatever size it may be, is only fixed on a convenient handle, so that the whole blade of the saw may pass through the fissure it makes in the material. All saws are made of the best steel, highly tempered, so as to recover their form if bent by the resistance of the wood.

Next to the saws and planes, *chisels* are the most indispensable tool to the carpenter. These *chisels* are of different widths, adapted to different uses, and are not only used with a hammer or mallet, as the mason employs them, but simply as cutting-tools, used by hand for finishing the re-entering angles of mortise-holes, or for finishing the ends of pieces of wood too small to be planed.

The carpenter employs *gimlets* for making holes for screws and nails. The gimlet is a short rod of steel, finished at one end into a sharp-pointed screw of one or two turns only, which, acting on the principle of that mechanical power, compels the tool to sink deeper and deeper into the wood, as the tool is turned round; and to enable the workman to turn the gimlet, it is fixed into a cross handle, which, acting as a lever, allows of the friction of the tool being overcome. Just above the screw point, the rod or shaft of the gimlet is *fluted* or hollowed out; the sharp edges of this fluted part cut the hole made by the screw-end larger and smoother, and the hollow receives the chips or shavings cut off, and prevents them from clogging the hole and stopping the progress of the tool.

Augers are large tools shaped like a gimlet, and, acting in the same manner, are employed for making large holes for bolts, spikes, &c. *Centre-bits* are steel tools of different shapes, made to fit into a bent handle something like the letter G, which, acting as a lever, allows of the tool being turned round and round by one hand, while by the other the workman holds the top of the handle steady and vertically over the point of the tool. Some of the *bits* or tools are for cutting out cylindrical holes, and are shaped at the cutting-edge like a chisel, with a small point projecting from the centre of the edge, on which the instrument turns in the wood and acts on the principle of a lathe. On each side this point, the chisel-edge is bent sideways in opposite directions, to allow of its *ploughing* up the wood before it with greater efficacy than it would do if it were not so formed.

The *brad-awl*, or *nail-piercer*, is a short steel wire, sharpened at the point into a flat chisel-edge, and put into a plain turned handle. This edge being pushed into the wood, and the handle turned round, the tool divides the fibre, and makes its way on the simple principle of a wedge, and does not cut away or remove any portion of the material as the above-described tools do.

The carpenter uses nails and screws to fasten the different parts of his work together, and it is necessary to make a hole to receive them before they are driven in, or else the wood would split by the action of forcing the nail or screw into the solid material, and, indeed, it would be impossible to force a screw into the solid wood at all.

The screw is forced into the wood by being turned round and round by means of a blunt chisel called a *screw-driver*, the edge of which is inserted into a notch cut in the head of the screw to receive it.

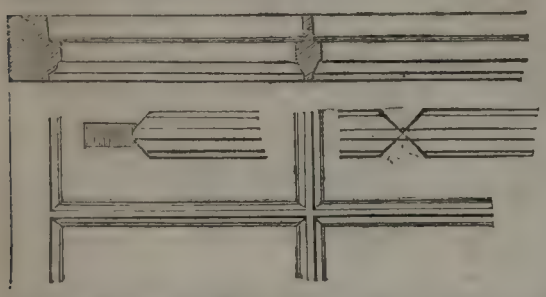
Joiners fasten one piece of their work to another by *glue* made by boiling down refuse animal matter containing the animal principle called *gelatine* in abundance, such as hoofs, horns, tendons, skin, gristle, &c.: it is a property of gelatine to dissolve in hot water, and to harden again when cold, and the water evaporates. Accordingly the glue, which is only concentrated impure gelatine, is dissolved by heat in a small quantity of water, and being applied to the clean faces of the wood to be united, by a coarse brush: these faces are closely pressed and retained together till the water evaporates, when such is the tenacity of the glue, that the wood may be broken in another place as easily as at the glued joint. To enable, glue, however, to act in this manner well, the wood should be clean, the parts to be glued

well warmed before the glue is applied, and the joint should be close, or the parts accurately brought together.

Besides the before-mentioned tools and materials, and some others, such as hammers, axes, &c., which need not be described, carpenters and joiners use instruments for measuring and setting out their work, and for drawing on the surface of the material the forms into which it is to be reduced, or the shape and situations of portions of the material to be removed for the purposes of framing. The instruments are compasses, squares, rules, levels, plumb-lines, and so on, common to all trades which form materials into artificial geometrical shapes: and, like the mason, the carpenter and joiner must be conversant with the more elementary problems of practical geometry.

Having described the principal tools used by this workman, we will return to the work performed by him, and in illustration of the subject, point out the mode of proceeding in making a window-sash, which is one of the most delicate operations in common joiner's-work. The outer part of the sash is made broader and stronger than the intermediate cross-bars which receive the panes of glass, in order to give strength and rigidity to the sash. This outer part is framed together at the four angles by mortises and tenons, the latter coming quite through the stuff, and having a small sharp wedge driven into the middle of the tenon when inserted into the mortise: by means of this wedge, the tenon is expanded at its end into a wedge-shaped form, by which it fits more tightly into the mortise and is retained in its place, the wedge-shape not allowing the tenon to be withdrawn again. But it may be here remarked that, besides this precaution, all small mortises and tenons are put together with glue to ensure the stability of the joint.

The inner edge of this frame is formed by a plane into the half moulding, of which the cross-bars present the entire section, so that when the sash is completed, each panel, as it were, which is filled in with the glass, is surrounded on its sides by a continuous moulding, and on the other side of the frame each panel presents a *rebate* in which the glass lies. The annexed figure of the section of part of the outer frame and one cross-bar, will make this clear.



The cross-bars are made in lengths out of slips of wood, by a plane, which first forms the mouldings and rebate on one side, and then by turning the slip over the same plane, finishes the other with an exact counterpart of the first. These bars are framed into the outer part of the sash by delicate mortises and tenons put together in the manner before described; but it will be seen by reference to the figure, that the moulded part of the bar must unite to that of the outer frame, or of another bar, by a *mitre* joint, that is, by one which allows of the lines of mouldings returning on the second piece, at right angles to their direction on the first, without any interruption to the continuity of the surface.

This and all analogous mitre-joints are formed by planing the ends of the wood to form a face, making an angle of 45° with the axis or length of the stuff, and the joiner is provided with a tool called a *mitre-box*, consisting of a stock or frame, in which the stuff being put, resting against one another's surface, guides the plane so as to cut off the end obliquely at the requisite angle. It is clear that this mitre must be made on both faces of the bar, and therefore the two mitre faces form a wedge-shaped termination by meeting at a right angle, as shown in the last figure. Now as besides the mitre end a tenon is to be left to fit into a mortise in the outer frame, it is clear that the whole must be a very nice piece of workmanship to be executed on so small a material as the thin bar of a modern sash.

The bevelled mitred end of the bar is received into a corresponding shaped notch cut the depth of the half moulding in the outer frame to receive it, and at the bottom of this notch is the fine mortise-hole intended to receive the tenon.

The bars of the sash can, of course, only be made in one length in one direction, and the cross-bars which divide the long panels, formed by these continuous bars, into the sizes of the glass, are made of similar short pieces with mitred ends; but these ends, where they frame into the long bars, have no tenon, the thinness of the stuff not admitting of one, since the cross-bars come, end for end, opposite each other, on the two sides of the upright bars.

It is evident that the long bars must be put together with the outside frame, or else the tenons could not be inserted into the mortises made in this last.

In further explanation of joiners'-work, we will briefly describe the mode of making a drawing-board, requiring to be *true*, *plane*, and *square*. Suppose the board is intended to be so wide as to require three boards side by side to make it: these three boards being sawn out of the right length, their edges are first planed perfectly straight and smooth, so that when any two are placed side by side, the edges touching, those edges may touch or fit together accurately for their whole length; this accuracy of joint is obtained by testing the edge after each time the plane is applied, by a straight-edge, or rule, known to be *true*. There are two modes of proceeding to make these joints firm, one by *dowelling*, that is, by inserting short pieces of hard wood, as oak or wainscot, let for half their length into a mortise cut in the edges of the boards that are to fit together; these mortises being, of course, made opposite each other, these dowels prevent the boards from rising up or starting from their places when the work is finished. Instead of short dowels a strip, the whole length of the boards, is let into each joint, half the strip lying in a ploughed groove, made in the middle of the corresponding edges of the two boards. But, besides these precautions, the joints are well glued up.

There are two modes by which this board may be strengthened, to prevent its *warping* or *casting* by the drying or shrinking of the wood. A cross-piece of deal, or better still of wainscot, is fixed across the ends of the boards, these ends being double rebated or *tongued*, to fit into a groove made in the cross-piece to receive the tongue; these cross-pieces prevent the long boards from warping, since the cross-pieces would have no tendency to alter their figure in the direction of their grain.

If, however, the board be larger, *keying* is better than this clamping. Clamping consists in attaching two stout cross-pieces at the back of the boards, the faces of which pieces are worked so as to fit, and are glued into a dovetail-shaped groove cut across the direction of the boards at their back to receive the keys, as will be understood from the annexed sketch.

When the board is made, and the glued joints quite dry, the face is planed perfectly smooth and level, and the edges made truly square, or at right angles; if the board be keyed, the back must be planed smooth before the keys are put in.

The flooring-boards in the better kinds of houses are often *dowelled* in the manner above described, and the ends of the flooring-boards are tongued and grooved to fit together, to prevent the boards from starting up from the joists and becoming uneven.

THE seven days is by far the most permanent division of time, and the most ancient monument of astronomical knowledge; it was used by the Brahmins in India, with the same denomination used by *us;* and was alike found in the calendars of the Jews, Egyptians, Arabs, and Assyrians. It has survived the fall of empires, and has existed among *all* successive generations; a *proof* of the common origin of mankind. The division of the *year* into months, &c., is very old, and almost universal, but not *so ancient* or uniform as the seven days, or week.—MRS. SOMERVILLE.

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QUEEN ELIZABETH; HER PROGRESSES AND PUBLIC PROCESSIONS. No. VI.

VIEW OF OLD SOMERSET HOUSE.

THE RESIDENCE OF THE PRINCESS ELIZABETH AT HATFIELD—HER AMUSEMENTS WHILE THERE—HER ACCESSION TO THE THRONE AND JOURNEY TO LONDON.

In our last paper on this subject we related the circumstances under which, in the year 1554, the Princess Elizabeth was imprisoned at the royal palace of Woodstock, under the charge of Sir Henry Bedingfield. After a confinement of many months she procured permission to write to the queen, but her importunate keeper intruded and overlooked what she wrote. At length, by the interposition of Mary's husband, King Philip, she was removed to court.

This sudden kindness of Philip, (says Warton,) who thought Elizabeth a much less obnoxious character than his father, Charles the fifth, had conceived her to have been, did not arise from any regular principle of real generosity, but partly from an affectation of popularity; and partly from a refined sentiment of policy, which made him foresee that if Elizabeth was put to death, the next lawful heir would be Mary, Queen of Scots, already betrothed to the dauphin of France, whose succession would for ever join the sceptres of England and France, and consequently crush the growing interests of Spain.

In the course of the first day's journey, which extended from Woodstock to the house of Lord Williams at Ricot, there came on a very violent storm of wind, which two or three times blew off the princess's hood, and the attire of her head. Upon this she begged to retire to a gentleman's house then at hand; but the extreme circumspection of Bedingfield led him to refuse this request, so that the princess was obliged to replace her head-dress under a hedge near the road.

On reaching Hampton Court, where the king and queen were then residing, Elizabeth found that she was still a prisoner. She was visited by Bishop Gardiner and others of the council, who endeavoured to persuade her to make a confesssion of guilt, and submit to the queen's mercy.

One night, when it was late, the princess was unexpectedly summoned and conducted by torch-light to the queen's bed-chamber, where she kneeled down before the queen, declaring herself to be the most faithful and true subject. She even went so far as to request the queen to send her some Catholic treatises which might confirm her faith, and inculcate doctrines different from those which she had been taught in the writings of the reformers. The queen seemed still to suspect her sincerity; but they parted on good terms. During this critical interview Philip had concealed himself behind the tapestry that he might have seasonably interposed to prevent the violence of the queen's passionate temper from proceeding to any extremities.

A week afterwards a change took place in the condition of Elizabeth. She was permitted to retire to Hatfield House, in Hertfordshire, then a royal palace, being placed under the care of Sir Thomas Pope. At parting, the queen presented her with a ring worth

seven hundred crowns; and at the same time recommended to her Sir Thomas Pope as a person whose humanity, prudence, and other qualifications, were calculated to render her new situation perfectly agreeable.

Elizabeth experienced great benefit from this change of keepers; Sir Thomas Pope behaved towards her with kindness and respect, "residing with her at Hatfield rather as an indulgent and affectionate guardian, than as an officious or rigorous governor." That he was also not wanting on proper occasions in showing her such marks of regard and deference as her station and quality demanded, appears from the following anecdote. Two of the fellows of Trinity College, in Oxford, just founded by him, had violated one of its strictest statutes, and were accordingly expelled by the president and society. Upon this they repaired to their founder then at Hatfield with the princess, humbly petitioning to be re-admitted into his college. Sir Thomas was somewhat perplexed; for although disposed to forgiveness, yet he was unwilling to be the first who should openly countenance or pardon an infringement of laws which he himself had made; but perceiving a happy opportunity of adjusting the difficulty, by at the same time paying a compliment to the princess, he with much address referred the matter to her gracious consideration; and she was pleased to order that the offending parties should be restored to their fellowships. Sir Thomas, in his letter to the president of the college, communicating this determination, states, that it was "at the desier or rather commandement of my ladie Elizabeth her grace," that he was content to "remytt this fault, and to dispence with thyem towching the same."

It appears also, that Sir Thomas Pope gratified the princess on some occasions with the characteristic amusements of the times, and that he did so both at his own expense and at the hazard of offending the queen,—as we learn from the following passage of an old chronicle:—

In Shrovetide, 1556, Sir Thomas Pope made for the ladie Elizabeth, all at his oune costes, a greate and rich maskinge, in the greate halle at Hatfelde; wher the pageaunts were marvellously furnished. There were ther twelve minstrels antickly disguised; with forty-six or more gentlemen and ladies, many of them knights or nobles, and ladies, apparelled in crimsin sattin, embrothered uppon witth wrethes of golde, and garnished with bordures of hanging perle. And the devise of a castell of clothe of golde, sett with pomegranates about the battlements, with shields of knights hanging therefrom, and six knights in rich harneis turneyed. At night the cuppboard in the halle was of twelve stages, mainlie furnished with garnish of gold and silver vessul, and a baseket of seventie dishes, and after a voidee of spices and suttleties,* with thirty spyse plates, all at the chardgis of Sir Thomas Pope. And the next day the play of Holophernes. But the queen percase mysliked these folliries, as by her letters to Sir Thomas Pope hit did appear, and so their disguisinges were ceased.

On some occasions, however, the princess was allowed to make excursions, either for pleasure or for the purpose of paying her compliments at court. It is related that on the 25th of February, 1557,—

The lady Elizabeth came riding from her house at Hatfield to London, attended with a great company of lords, and nobles, and gentlemen, unto her place called Somerset-place, beyond Strand-bridge, to do her duty to the queen. And on the twenty-eighth she repaired unto her grace at Whitehall, with many lords and ladies. (And again, one day in March, the same year,) aforenoon, the lady Elizabeth's grace took her horse and rode to her palace of Shene, with many lords, knights, ladies, and gentlemen, and a goodlie company of horse.

In April, the same year, she was escorted from Hatfield to Enfield-Chase, by a retinue of twelve ladies clothed in white satin, on "ambling palfries," and twenty yeomen in green, "all on horseback, that her grace might hunt the hart." On entering the chase or forest she was met by fifty archers in scarlet boots and yellow caps, armed with gilded bows, one of whom presented her with a silver-headed arrow, winged with peacocks' feathers. Sir Thomas Pope had the *devising* of this show; at the conclusion of which, the princess was gratified with the privilege of "cutting the throat of a buck." In the same month, likewise, she was visited at Hatfield by the queen, when the great chamber was adorned with a sumptuous suit of tapestry, called the *hangings of the siege of Antioch*, and after supper a play was performed by the choir-boys of St. Paul's.

In the summer of this year, the princess paid a visit to the queen at Richmond. She went by water from Somerset-place, in the queen's barge, which was richly hung with garlands of artificial flowers, and covered with a canopy of green sarcenet, wrought with branches of eglantine on embroidery, and powdered with blossoms of gold. She was accompanied by Sir Thomas Pope and four ladies of her chamber. Six boats attended on this procession filled with her highness's retinue, habited in russet damask and blue embroidered satin, lapelled and spangled with silver, with bonnets of cloth of silver, plumed with green feathers. She was received by the queen in a sumptuous pavilion made in the form of a castle, with cloth of gold and purple velvet, in the labyrinth of the gardens. The walls or sides of the pavilion were chequered into compartments, in each of which was alternately, a lily in silver, and a pomegranate in gold. Here the party were entertained at a royal banquet, in which was introduced "a sottletie of a pomegranate tree," bearing the arms of Spain. There were many minstrels but there was no masking or dancing. In the evening the princess with all her suite returned as she had come, to Somerset-place; and the next day went back to Hatfield.

During the period of her residence at Hatfield, the Princess Elizabeth was also present at a royal Christmas, kept with great solemnity by Philip and Mary at Hampton Court. On Christmas eve the great hall of the palace was illuminated with a thousand lamps, curiously disposed. The princess supped at the same table in the hall with the king and queen, next the cloth of state; and after supper, was served with a perfumed napkin and plates of confects by the Lord Paget; but she retired to her ladies before the revels, maskings, and disguisings began. On St. Stephen's day she heard mattins in the queen's closet, adjoining to the chapel, where she was attired in a robe of white satin, strung all over with large pearls. On the 29th day of December she sate with their majesties and the nobility at a grand spectacle of jousting, when two hundred spears were broken, half of the combatants being accoutred in the "Almaine" and half in the Spanish fashion. All these particulars, which are minutely recorded by a chronicler of the day, are considered by Warton, the biographer of Sir Thomas Pope, as affording a vindication of Queen Mary's character in the treatment of her sister, and as proving that the princess, during her residence at Hatfield, lived in splendour and affluence, that she was often admitted to the diversions of the court, and "that her situation was by no means a state of imprisonment and oppression, as it has been represented by most of our historians."

It has been mentioned above, that Sir Thomas Pope, during his attendance on the princess, was engaged in founding Trinity College, at Oxford. An undertaking of such a nature could not fail to attract the attention of Elizabeth, whose learned education

* Curious devices in cookery or confectionary.

naturally interested her in the progress of a work so beneficial to the advancement of learning. It appears from a letter written by Sir Thomas Pope, that the new college often formed a subject of conversation between him and his illustrious charge.

The princess Elizabeth, her grace, whom I serve here, often askyth me about the course I have devysed for my scollers: and that part of myne estatutes respectinge studie I have shewn to her, which she likes well. She is not only gracious but most learned, as ye right well know.

Elizabeth resided at Hatfield during the rest of Mary's reign; she spent there four years, which, as Warton observes, were by far the most agreeable part of her time during that turbulent period; for, although she must have been often disquieted with many secret fears and apprehensions, yet she was here perfectly at liberty, and treated with a regard due to her birth and expectations. In the mean time, to prevent suspicions, she prudently declined interfering in any sort of business, and abandoned herself entirely to books and amusements. The pleasures of solitude and retirement were now become habitual to her mind, and she principally employed herself in playing on the lute or virginals, embroidering with gold and silver, reading Greek, and translating Italian. She was now continuing to profess that character which her brother Edward gave her, when he used to call her his *sweet sister Temperance!* But she was soon happily removed to a reign of unparalleled magnificence and prosperity.

Queen Mary died on the 17th of November, 1558, about eleven or twelve o'clock. Soon afterwards the lady Elizabeth was proclaimed queen by divers heralds of arms, trumpets sounding, and many of the chief nobility present, as the Duke of Norfolk the Lord Treasurer, the Earls of Shrewsbury and Bedford; also the Lord Mayor and his brethren the Aldermen, with many others. In the afternoon the bells in all the churches of London were rung in token of joy, and at night bonfires were made, and stalls set out in the streets, "where was plentiful eating and drinking, and making merry." The next day, being Friday, a fasting day, there were no public rejoicings, but on the Saturday, *Te Deum Laudamus* was sung and said in the churches of the metropolis. "Thus," says Strype, "the satisfaction generally conceived by the people for this new queen, superseded all outward appearances of sorrow for the loss of the old one."

Elizabeth was at Hatfield when her sister died, and she remained there for some days afterwards. On the 23rd of November she removed to London, attended by "a thousand or more of lords, knights, gentlemen, ladies, and gentlewomen;" at Highgate she was met by the Lord Mayor, Aldermen, and Sheriffs, who conducted her to the Charter-house, then the residence of Lord North.

In which removing and coming thus to the citie, it might well appeare how comfortable hir presence was to them that went to receive hir in the waie, and likewise to the great multitudes of people that came abroad to see hir grace, shewing their rejoicing harts in countenance and words, with heartie prayers for her Majesties prosperous estate and preservation; which no doubt were acceptable to God, as by the sequel of things it may certenlie be believed.

The Queen remained at the Charter-house until the 28th, when she removed to the Tower. All the streets through which she had to pass were new gravelled. "She rode through Barbican, and, entering the citie at Cripplegate, kept along the wall as far as Bishopsgate, when she turned off to Leaden Hall, passed through Gracechurch Street and Fenchurch Street, and turning down Mark Lane, into Tower Street, reached the Tower." Before her rode many gentlemen, knights, and nobles,—then the trumpeters,—then all the heralds in array, "my Lord Mayor, holding the Queen's sceptre, riding with garter," and Lord Pembroke bearing the Queen's sword. Then came her grace on horseback, apparelled in purple velvet, with a scarf about her neck; the serjeants of arms being about her person. Immediately after the Queen rode Sir Robert Dudley, (afterwards Earl of Leicester,) who was her Master of the Horse; and then the guard with halberds. There was "great shooting of guns," the artillery in the Tower firing continually for almost half an hour; so that "the like was never heard before." In certain places stood children, who made speeches to her as she passed; and in other places was "singing and playing with regals." Thus, "with great joie and presse of people, of whom all the streets were full as she passed, declaring their inward rejoisings by gesture, words, and countenance," the Queen entered the Tower.

At the Tower Queen Elizabeth remained until the 5th of December, when she removed a little nearer to Westminster,—namely, to the Strand House, or Somerset House, "going by water, and shooting the bridge, trumpets sounding, much melody accompanying, and universal expressions of joy among the people." On the 23rd she went to the palace at Westminster, where she kept her Christmas, and resided for some time.

The 15th of January had been appointed for her Majesty's coronation; and we are told that in Christmas week, "scaffolds began to be made in divers places of the city for pageants against the day the Queen was to pass through to her coronation, and the conduits to be new painted and beautified." On the 12th of January the Queen removed from Westminster to the Tower,—a change preparatory to her passage through the city. She went by water, and was attended by the Lord Mayor and Aldermen in their barge, and all the citizens, "with their barges decked and trimmed with targets and banners of their mysteries." "The bacheller's barge of the Lord Maior's companie, to wit, the mercers, had their barge with a foist trimmed with three tops, and artillery aboord, gallantlie appointed to wait upon them, shooting off lustily as they went, with great and pleasant melodie of instruments, which plaied in most sweet and heavenlie manner." Her grace shot the bridge "about two of the clocke in the afternoon, at the still of the ebbe;" and landed at the privy stairs at the Tower wharf.

Our engraving presents a view of old Somerset House, such as in all probability it appeared from the water in the reign of Elizabeth. This structure was erected in the reign of Edward VI., by his uncle, the protector Somerset, who very unscrupulously demolished several buildings, some of them ecclesiastical, as well to make way for his new palace as to provide materials for the same. The architect of the edifice is supposed to have been John of Padua, the "deviser" of buildings to Henry VIII.; and it furnished one of the earliest specimens of the Italian style in this country. It passed to the crown upon the attainder of the protector; and doubts have been expressed whether Somerset was not beheaded before its completion. Great alterations were made in this palace by Inigo Jones, in the reign of James I., in order to fit it for the reception of Prince Charles and his bride, Henrietta Maria of France. Our engraving, however, shows the building as it appeared before those alterations. In the river is introduced part of a royal procession on the Thames, from authorities referring to the reign of James I., and, in all probability equally applicable to that of Elizabeth.

ILLUSTRATIONS OF THE BIBLE FROM THE MONUMENTS OF ANTIQUITY. No. XIV.

SACRED DANCE, WITH CYMBALS.

TRIUMPH OF THE ISRAELITES IN THEIR DELIVERANCE.

AFTER the children of Israel had been so signally delivered from imminent ruin, by the destruction of proud Pharaoh and his host in the Red Sea, Moses composed a hymn of triumph, which may be regarded as the earliest specimen of the sublime poetry of the Hebrews. A more literal version of this noble hymn than that given in the authorized translation, will probably be acceptable to our readers:—

I will sing unto Jehovah because he hath been gloriously exalted;
The horse and his rider he hath hurled into the sea.
My strength and song is Jah, and he shall be to me for salvation;
He is my God, and I will make him a dwelling;
The God of my fathers, and I will exalt him.
Jehovah is mighty in war; Jehovah is his name.
The chariots of Pharaoh and his hosts he hath cast into the sea;
His chosen charioteers are sank in the sea of weeds*:
Depths have covered them: they sank to the dark recesses like a stone.
Thy right hand, O Jehovah, hath been glorified in power:
Thy right hand, O Jehovah, hath dashed the enemy in pieces.
And in the greatness of thy Majesty, thou hast thrown down those rising against thee.
Thou sentest forth thy burning: it consumed them like stubble;
And by the breath of thy nostrils the waters were heaped together.
The floods erected themselves as a heap:
The depths were congealed in the heart of the sea.
The enemy said,—I will pursue:—I will overtake:—
I will divide spoil: my soul shall be satiated upon them.
I will draw my sword: my hand shall repossess them
Thou didst blow with thy wind: the sea hid them.
They sank as lead in the mighty waters.
Who is like unto thee among the gods, O Jehovah?
Who is like unto thee,—glorious in holiness,—
Exalted in power,—doing wonders?
Thou didst stretch forth thy right hand: the earth swallowed them.
Thou hast led forth in thy mercy the people which thou hast redeemed.
Thou hast guided them in thy strength to the dwelling of thy holiness.

* Yam Súph, that is, "the Sea of Weeds," is still the oriental name of the Red Sea

Nations shall hear and tremble greatly,
Terror shall seize the dwellers in Palestine;
Then the leaders of Edom shall be alarmed:
The mighty of Moab—them shall a shuddering possess.
All those dwelling in Canaan shall melt away;
Upon them shall fall fear and terror:
By the might of thy arm they shall be still as a stone,
Until thy people pass over, O Jehovah!
Until thy people pass over, which thou hast purchased.
Thou shalt bring them and plant them in the mountain of thine inheritance,
The place for thy rest, which thou, Jehovah, hast made;
The sanctuary, O Lord, thy hands have established.
Jehovah shall reign for ever and ever.
For the horse of Pharaoh went with his rider and his chariots into the sea,
And the sons of Israel walked on dry land in the midst of the floods.

This magnificent hymn appears to have been immediately adopted as a national anthem; the initial letters of the Hebrew words in the line

Who among the gods is like unto thee, O Jehovah?

were inscribed on the standards of the Maccabees, and, indeed, gave them their name. The moment it was uttered, the Jewish maidens sang the hymn of triumph, with all the joy and exultation which so wondrous a deliverance naturally inspired.

Miriam the prophetess, the sister of Aaron, took a timbrel in her hand; and all the women went out after her with timbrels and with dances. And Miriam answered them, Sing ye to the Lord, for he hath triumphed gloriously; the horse and his rider hath he thrown into the sea. (Exodus xv. 20, 21.)

The engraving at the head of this paper, taken from the Egyptian monuments, shows us that the triumphal processions were generally formed by damsels, who danced in solemn measure, and accompanied themselves on the timbrels and cymbals. This was also the custom among the Israelites. Thus when Jephthah won such a signal victory over the Ammonites, and rashly vowed that he would sacrifice to the Lord "whatever came first out of the doors of his house," his daughter presented herself, in her anxiety to head the choir of damsels who assembled to celebrate her father's victory.

And Jephthah came to Mizpeh unto his house, and,

behold, his daughter came out to meet him with timbrels and with dances: and she was his only child; beside her he had neither son nor daughter. And it came to pass, when he saw her, that he rent his clothes, and said, Alas, my daughter! thou hast brought me very low, and thou art one of them that trouble me: for I have opened my mouth unto the Lord, and I cannot go back. (Judges xi. 34, 35.)

These dances were not only customary on festive occasions, but they were also consecrated to the service of religion, as appears from the words of David, in the psalm which he composed to celebrate the removal of the ark.

They have seen thy goings, O God; even the goings of my God, my King, in the sanctuary. The singers went before, the players on instruments followed after; among them were the damsels playing with timbrels. (Psalm lxviii. 24, 25.)

In the last of the psalms we find that the cymbals were the instruments most frequently used on occasions of public thanksgiving, for the Psalmist repeats his exhortation to their use with great emphasis: "Praise the Lord upon the loud cymbals, praise him upon the high sounding cymbals." (Psalm cl. 5.) The Psalmist also recommends the use of the sacred dance: "Praise the Lord with the timbrel and dance." (Psalm cl. 4.) It appears from the Egyptian monuments that the dancers and cymbal-players were of a lower rank than other musicians, and hence it was that when Michal, the daughter of Saul, saw King David "dancing before the Lord," in the triumphal procession which escorted the ark of the covenant unto Jerusalem, "she despised him in her heart." (2 Samuel vi. 16.)

The stringed instruments used by the ancient Egyptians differed very little, if at all, from those which we find mentioned in the Old Testament. The most remarkable of them are represented in the following engraving. The figure to the right bears a portable harp, which is without a fore-piece; but the harps used by male performers, and by females when they were stationary, had very large fore-pieces, rising to the height of about one-third of the instrument, and fancifully carved. The performers played them both sitting and standing; and the music was so highly valued, that it was believed capable of dispelling cares, and even curing mental diseases. When Saul was visited by an evil spirit after disobeying the Divine command, we find his servants recommending him to seek out a skilful harper, and particularly pointing out David, whose attainments in music were celebrated even in his early youth.

And it came to pass, when the evil spirit from God was upon Saul that David took an harp, and played with his hand: so Saul was refreshed, and was well, and the evil spirit departed from him. (1 Sam. xvi. 23.)

The second figure to the right carries a lyre, which was also a favourite instrument among the Jews, but which has been confounded with the harp by our translators; it was generally, if not always, used as an accompaniment to vocal music, and hence we find the harp, or lyre, so constantly mentioned in the psalms.

The instrument in the hand of the third figure is a viol, which was played with the fingers like the modern guitar. It was an instrument particularly used upon festive occasions, and hence Isaiah, denouncing God's wrath against Babylon, declares,—

Thy pomp is brought down to the grave, and the noise of thy viols: the worm is spread under thee, and the worms cover thee. (Isaiah xiv. 11.)

And the prophet Amos, similarly proclaiming the punishments which God was about to inflict upon the kingdom of Israel, connects the viols with the vocal music:—"Take thou away from me the noise of thy songs, for I will not hear the melody of thy viols." (Amos v. 23.)

The trumpet and the reed-pipe appear to have been the only wind instruments with which the ancient Egyptians were acquainted. We see a double pipe, of very simple construction, borne by the fourth figure in our engraving, but we cannot determine the number of holes with which it was perforated. This instrument was chiefly used on joyous occasions; for it is particularly recorded, that when Solomon was proclaimed, "The people piped with pipes, and rejoiced with great joy, so that the earth rent with the sound of them." (1 Kings i. 40.) It appears, from a passage in the New Testament, that pipes were commonly used by children in their sports, for our Lord compares the froward generation of the Jews to children, who would not dance when their companions piped for them. (Matt. xi. 16, 17.)

The next figure carries a harp, or psaltery, of singular construction, on her shoulder. This instrument was only valuable as an accompaniment, for we find no example of it in the hands of an isolated performer.

The last of the musical train is keeping time with her hands, a custom which seems to have prevailed in almost every nation.

It is improbable that the Israelites, on their departure from Egypt, could have brought with them all the musical instruments necessary for a perfect concert; indeed, the timbrels alone are mentioned: but in later ages, especially in the reign of David, the national hymns of thanksgiving were accompanied

CHOIR OF FEMALE MUSICIANS.

by the music of a greater variety of instruments than we have described.

It deserves to be remarked, that the cymbals which were so highly valued in the earlier part of the Jewish history, seem to have fallen into contempt after the Roman invasion; for St. Paul compares the worthlessness of a man, destitute of charity, to "sounding brass or a tinkling cymbal." (1 Cor. xiii. 1.) But while the Jewish kingdom flourished in its integrity, cymbals were so highly valued, that they were always introduced into public worship; for we are told of Hezekiah, that,—

He set the Levites in the house of the Lord with cymbals, with psalteries, and with harps, according to the commandment of David, and of Gad the king's seer, and Nathan the prophet: for so was the commandment of the Lord by his prophets. (2 Chron. xxix. 25.)

ON EMPLOYMENTS WHICH INJURE THE EYE-SIGHT.

No. V.

ON THE CUSTOMARY USE OF GLASSES.

IN young persons, long-sightedness is occasioned by the flatness of the crystalline lens, and may be remedied by employing a convex lens, which prevents the convergency of the rays beyond the retina, which otherwise occurs, by which vision is indistinct, for a reason the very opposite to that by which short sight is produced.

The powers of the eye are so influenced by the employments to which it is habitually subjected, that we must, in many cases, refer acuteness or dimness of vision to the exercises fitted or unfitted to the function of the optic structure. The short or the long-sighted eye, provided the organism of the parts be healthy, have their comparative want of adaptive power remedied, as we have seen by the assistance of a concave or convex lens; but no single lens will confer on the landsman the perfect adjusting power to great distances of the seaman, to whose eye the speck on the extreme horizon, often invisible to the unaccustomed eye, appears in all the detail of a well-appointed vessel, the number of whose guns, her flag, her masts, &c., are accurately detailed, while, on the other hand, the same long sight is inadequate to the detail of near and minute objects, which the short-sighted eye appreciates so well. But, however wise and beneficent is the principle which gradually adapts an organ to its accustomed employments, provided they are not at variance with its legitimate use, the same principle fails to explain the great superiority in vision of some individuals, among the lower animals as well as in man, over others. The eagle and other birds of prey possess remarkably acute vision for near as well as distant objects: soaring high in the air, so as to command an extensive range of prospect, they have the power, it is said, of pushing out the cornea to increase its convexity, and so include a wider range of vision; but it is probable that this superior vision, ascribed to a more complete and comprehensive power of adaptation, which theory only assumes, and experience does not confirm, ought rather to be ascribed to a superior sensibility of the retina, since anatomy shows that the optic nerve in such animals is not only large, but ramified in a complete manner, such as is not found in man.

Let us now suppose that a healthy eye is constantly employed in looking through optical glasses, such as watchmakers, engravers, naval officers, philosophical instrument-makers, astronomers, &c., the adjusting powers of the eye are being constantly taxed, that is, the crystalline lens is brought nearer to the pupil than in its natural state it ought to be. The ciliary apparatus and that belonging to the iris is overworked, and hence arises derangement of the functions of the different parts. Extreme caution requires to be exercised in the use of these instruments; the eye should be allowed long intervals of repose, and much will depend on the state of the individual's health generally. Above all things, we caution our young readers to beware of adopting that silly bauble, a quizzing-glass; for, even to short-sighted persons its operation is bad, since it contributes to render the adjusting powers of the two eyes unequal; and if the healthy eye persist in its use, a few years will suffice to bring the floating muscæ to the eye which so needlessly employs the glass, as a prelude to disorders of a more serious kind.

It is a point of much importance in the choice of spectacles, that the substance of the glass should be free from opaque impurities, and its surface from scratches or indentations, because the existence of either of those irregularities necessarily occasions an unequal action of light upon the retina. Let us illustrate this by an extreme case. Suppose an individual were constantly to wear spectacles, and that when one of the glasses had a black spot, an eighth of an inch diameter near the centre, the retina at one particular spot spherically opposite to the opaque spot on the glass, would be deprived of the direct rays usually impingent upon it, and would only receive those coming by oblique directions; the consequence of which would be, that the retina would be unequally acted upon, and so far from being benefited by that spot being less excited, it would produce those unnatural effects, which always accompany the partial exercise of an organ to the exclusion of another part, which is generally an inflammation of the line of separation between the active and the inert portions. This being the case in an extreme instance, we may expect effects somewhat analogous, but slighter, when the irregularity is smaller, independent of the dimness which is given to the images of objects on the retina.

Spectacles should always be chosen less powerful than is necessary for absolutely distinct vision, or the eye gets wearied and distressed by the use of them, and what is perhaps as bad, the disease is increased by the violence of the intended cure. The writer, speaking from experience, recommends near-sighted individuals to be content with vision a *little* obscured, and to be thankful that science affords the means of attaining even that imperfect degree of visual perception.

In concluding this article we may remark that our object has not been to excite alarm by contributing to the fears of the many, the employment of whose eyes furnishes them with daily bread. The several trades and professions that we have named, and from which many of our illustrations have been taken, may, we are convinced, be exercised with impunity, provided the exercise be attended with caution. Cleanliness, bodily exercise, and temperance, are the main safeguards which will not fail to prevent the evils we have cited, or to mitigate their action if they have already begun.

Those who have obtained the farthest insight into nature have been in all ages firm believers in God.—WHEWELL.

No object is more pleasing to the eye, than the sight of a man whom you have obliged; nor any music so agreeable to the ear, as the voice of one that owns you for his benefactor

CORONATION ANECDOTES.

No. I.

William the Conqueror.

William was very anxious that his conquest of England should at least appear to be sanctioned by the consent of the people, and he therefore gave orders that his new subjects should be invited to witness the ceremony of his coronation, on Christmas day, 1066. Stigand, archbishop of Canterbury, refused to perform the ceremony, as some assert, because he looked upon the Norman prince as an intruder; but Langtoft* informs us that Stigand was at the time suspended by the pope. The passage in Langtoft is curious:

> Fair grace William fond; his chance fulle wele him satte
> The reame of Inglond so graciously he gatte.
> The archbishop Stigand, of Inglond primate
> That tyme was suspended, the pope reft him the state,
> The abbot & priowre, men of religion
> The oder men of honoure, archdeeane & person
> Wer prived of thar office, of woultes had renoun
> For lechorie that vice wer many als don doun.
> The archbishope of York com with devocioun,
> Thorgh William praiere, com to London toun,
> Bifor the barons brouht, he gaf William the coroun
> To chalange was he nouht, Sir Stigand was don doun.

After William had taken the coronation oath, to protect the church, prohibit oppression, and execute judgment in mercy, Aldred put the question, "Will ye have this prince to be your king?" the people answered with loud shouts, and the noise gave so much alarm to the Norman garrison in the city, that the soldiers believing the English to have revolted, without waiting to make any investigation, immediately set the next houses on fire, which spreading and giving a general alarm, most of the congregation rushed out of the church, the English hastening to stop the fire, and the Normans to plunder. The bishops, clergy, and monks, who remained within the church, were in such confusion, that they were scarcely able to go through the office of crowning the king; William himself, who saw the tumult, and could not conjecture its cause, sat trembling at the foot of the altar, and though no great mischief was done by the fire, it laid the foundation of a long and inveterate enmity between the English and the Normans.

Matilda, William's queen, was crowned eighteen months afterwards, by the same archbishop of York.

William II., Rufus.

William II. laid claim to the crown by virtue of a form of election; the nobles believing that he would be less inclined to control their usurped privileges than his elder brother, Robert. He was crowned at Westminster, September 27th, 1087, by Lanfranc, archbishop of Canterbury, and the archbishop of York; eight other bishops, and many of the chief nobility, assisted at the ceremony. Besides swearing to observe justice, equity, and mercy, in all his conduct, and to maintain the peace, liberties, and privileges of the church, he promised that he would follow the archbishop's counsels in all his administrations, and, as Fabian says, "he was well eyded of Lamfrank whyle he lyved, for he was dyvers and unstable of manners, so that atwene hym & his lordes was often dyssension." Langtoft specially mentions the ring in this coronation:

> To William the rede kyng is gyven the coroun,
> In Westmynstere tok he ryng in the abbay of Londoun.

Henry I.

The coronation of Henry I. was performed in a hurried manner, on the fourth day after the death of Rufus, by Maurice, bishop of London, the archbishop of Canterbury being out of the country. In every respect the forms of his coronation were the same as those of the Saxon kings. But it appears from Langtoft, that he was crowned a second time, by Anselm, archbishop of Canterbury, after his marriage with Matilda, niece of Edgar Atheling, of the ancient Saxon line, or, as Langtoft calls her, "kyng & sire," that is, a sovereign in her own right.

> Henry wedded dame Molde that kyng was & sire;
> Saint Anselme, men tolde, corouned him and hire
> The coromyng of Henry & of Molde that may[a]
> At London was solemply on St. Martin's day.

He afterwards married Adeliza of Lorraine, and had her crowned with the usual solemnities.

Stephen.

The coronation of Stephen, after he had sworn allegiance to the empress Matilda, was viewed with great anxiety, in an age when it was supposed that the punishment of perjury was immediate and visible. The ceremony was performed by William, archbishop of Canterbury; and it is said that a dreadful storm arose, which threw all the parties into such confusion, that the consecrated wafer fell on the ground, the kiss of peace after the sacrament was omitted, and even the final benediction forgotten. It was also remarked, that the archbishop, and the false witnesses who declared that Henry I. disinherited his daughter a little before his death, met a speedy and miserable end. In consequence, probably, of these disasters, Stephen was compelled to swear a new oath to the barons at Oxford, which is thus described by Langtoft:

> Bot sen dis courounyng till Oxenford he fore,
> Ther Steven the king bifor the clergie swore
> That if a bishopriche vacant wer the se
> The kyng, ne non of his, suld chalage that of fe.
> With wrong no with right, of non that from him cam
> So help him God Alle myght, and that halidame[b]
> A nother oth not lesse the clergie did him karke[c],
> That wodes ne foreste, withoufen palaised parke,
> The common folk suld queme on[d], & other in fere,
> The kyng no man suld deme[e] in court for wild dere
> Clerk[f] ne lewed[g] man for no wilde beste
> For common the folk it wan[h] wod open and forest.
> The third poynt thei wild[i] to swere he was dryven
> That the Danegeld for ever suld be forgyven
> And of ilk[k] a hide two schillynges that he toke
> Suld never eft betide, he swore that on the boke.

The three clauses of this oath are singularly characteristic of the age; the necessity for the first clause arose from the custom of keeping sees vacant, and applying their revenues to the use of the crown until a new bishop was chosen, and it is also connected with the question of lay investitures, which at that time convulsed Christendom. In the second clause we find that the forest-laws, so rigidly enforced by the Norman kings, were a serious grievance; indeed, all the old historians agree that the worst feature in the administration of Henry I. was the severity with which he punished those who took venison in the royal forests, cut down wood, or committed any waste therein, and under pretence of such trespasses he had heavily fined several gentlemen who had the reputation of being wealthy. *Danegeld* was the name of the tax imposed by the Saxon kings to defray the expense of the armaments necessary to defend the coast of England against the Danes; its continuance under the Normans, who were themselves of Danish descent, was felt to be an insulting and galling badge of slavery.

* Langtoft, an Augustin friar, who about the commencement of the fourteenth century wrote a chronicle of England in verse.

[a] Maiden. [b] The Virgin Mary. [c] Charge. [d] Take pleasure on. [e] Doom, judge. [f] Clergyman. [g] Layman. [h] Procured. [i] Required. [k] Each.

HENRY II.

Henry, called Fitz-Empress, from his mother, and Court-Mantel, from his having introduced the fashion of short cloaks into England, was crowned at Westminster on the Sunday before Christmas day, A. D. 1154, being the Romish feast of St. Ligerius, by Theobald, archbishop of Canterbury. Although his hereditary right was unquestionable, he was formally elected by the clergy and people; they testified their assent by loud acclamations, and Langtoft insinuates that his subjects were more anxious to have him for a king than he was to acquire a kingdom:

To London thei him brought with grete solempnitie
The popille him besouht ther kyng for to be
The day of St. Liger was Henry corouned king
Thebald of Canterber gaf him the coroune and the ryng.
This Henry was Mald[a] sonne, the erle wif of Anjowe
The Emperice was wonne[b] and right heyre for to trowe[c]
For Henry dochter & his heyre thorgh sight[d],
Now comes hir sonne in pas, Henry hir heyr thorgh right.

It is said that Henry was crowned again with his queen, A. D. 1159, but Mr. Arthur Taylor plausibly conjectures that this report arose from his having worn the crown during the ceremony. Indeed it was usual for the English kings to have a kind of minor coronation performed at the great festivals, but this was terminated, A. D. 1159, when Henry and his queen, spending the Easter holidays at Worcester, entered the offertory in solemn procession, placed their crowns upon the high altar, and vowed never to wear them again during their lives.

Early in the year 1170, King Henry adopted what was in England a very unusual measure, and which was manifestly pregnant with danger; he proposed to his parliament to have his son Henry crowned titular king. Gervase of Canterbury insinuates that some of the nobles were unwilling to comply with this proposal, but that they feared to oppose the king's pleasure, lest he should bring them to trial for various malversations and outrages during Henry's absence in Normandy. The young prince was knighted by his father on the morning of the 14th of June, being the second Sunday after Trinity, and the same day was crowned by Roger, archbishop of York, assisted by the bishops of Durham, London, Salisbury, and Rochester, in the abbey church of Wesminster. William, king of Scotland, his brother David, and a greater number of nobles and prelates than had ever assembled at a like solemnity, performed fealty and homage to the young king on the following day, with a limitation, "saving the fealty due to their lord the king, his father."

On this occasion Henry did not exhibit his usual prudence, but seems to have been guided by passion rather than policy. The ceremony of the coronation was performed by the archbishop of York, without any protestation to save the rights of the see of Canterbury, and the prince's wife, daughter to the king of France, was not crowned with him, according to the usual practice when the king has a consort. The former of these circumstances was an intentional insult to the archbishop of Canterbury, Thomas à Becket, then in the midst of his fierce contest with the king, and every precaution had been taken to make the injury more flagrant. The king, immediately after the death of archbishop Theobald, got a bull from the pope, allowing him to have his son crowned by whatever prelate he pleased; but Becket contended, and probably with truth, that this licence was obtained to prevent the archbishop of York from pretending to consecrate the new king, as matter of right, in case the see of Canterbury should be vacant. Roger, archbishop of York, also obtained a bull, granting him the privilege of crowning the king of England, as some of his predecessors had done, and of having his cross carried erect before him through all the kingdom. The latter privilege was restricted, however, to the archiepiscopal province of York by a subsequent bull, and Becket's partisans maintained that the former had been tacitly subjected to a similar limitation. Roger, however, was a privileged person; he was the papal legate for Scotland, and therefore exempt from Becket's legatine jurisdiction, and consequently he was the fittest prelate to consecrate the youthful sovereign.

The apparent slight to the princess Margaret arose solely from the necessity of keeping the exact time of the coronation secret, and thus frustrating the machinations of Becket. As soon as the ceremony was completed, the king sent orders to provide a suitable equipage for Margaret with all the ornaments necessary to the state of a queen. Becket's conduct proves the importance of this secrecy; he had sent inhibitions to the archbishop of York and all the English bishops, forbidding them to officiate at the coronation, and had procured bulls from the pope to the like effect, which, however, the papal messengers were afraid to carry into England. Roger, bishop of Worcester, undertook to convey the papal inhibitions to the English parliament, but he was stopped at Dieppe by Richard du Hommet, justiciary of Normandy, and an embargo laid on all the shipping in the harbour, until the coronation was over.

At the coronation feast, Henry with his own hand served up a dish at the prince's table, but the arrogant boy, instead of feeling grateful for the unusual honour conferred upon him, said to the archbishop of York, who complimented him upon it, "Assuredly it is not a great condescension for the son of an earl to wait on the son of a king." Prince Henry was crowned a second time, in company with his wife Margaret, at Winchester, A.D. 1172, by the archbishop of Rouen assisted by the bishops of Evreux and Worcester. The see of Canterbury was then vacant, and the king of France, for whose gratification the ceremony was performed, insisted that neither the archbishop of York, nor the bishops of London or Salisbury, should officiate at the coronation.

[a] Matilda's. Believed to be the rightful heir.
[b] Found.
[d] Manifestly.

ON THE LOSS OF A BELOVED OBJECT.

THE voice which I did more esteem
Than music in her sweetest key;
Those eyes which unto me did seem
More comfortable than the day;
Those now by me, as they have been,
Shall never more be heard, or seen;
But what I once enjoyed in them,
Shall seem hereafter as a dream.

All earthly comforts vanish thus;
So little hold of them have we,
That we from them, or they from us,
May in a moment ravished be.
Yet we are neither just nor wise,
If present mercies we despise;
Or mind not how there may be made
A thankful use of what we had.—WITHER.

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THE WYE AND MONMOUTHSHIRE. No. I.

RHAYADYR BRIDGE.

How "delightsome" are the associations connected with the Wye! yet how few amongst the great mass who have the means of making an annual excursion in search of health or recreation, are acquainted with it except by name. It shall be our object to give a full and popular illustration of this romantic river, in a short series of papers, with such notices of the remarkable antiquities and highly-interesting country through which it passes, within reach of the tourist, as may tend to render the subject complete. We trust that we shall thus diffuse information amongst the body of our readers, which many of them may be able to turn some day to pleasant account.

Our opening remarks may be widely extended. Notwithstanding all the advantages of cheap travelling and steam-boats, how slight is the acquaintance of the majority of our countrymen of the middle, and often of the higher, classes, with the wonders of nature and art that abound in their native land. To our mind the first duty of a man who possesses the means of travelling, should be to make a minute acquaintance with his own country. Comparatively few amongst us are thoroughly acquainted with England,—Wales, that stronghold of the picturesque, although very easily accessible, is trodden but by a few,—Scotland, our northern hill-country, with its wild and romantic shores and groups of islands, is still, except by hearsay, as little known to many Englishmen as Polynesia,—and Ireland, though rich in natural beauty of the highest class, is an absolute *terra incognita*; we have, however, undertaken the agreeable task of supplying information on these subjects, and we refer to our papers on Ireland, and other places, with peculiar satisfaction.

It has been well remarked by an ingenious writer, in contrasting the scenery of Great Britain with that on the continent of Europe, that magnitude is not essential to beauty, and that sublimity is not always to be measured by yards and feet. A mountain may be loftier, or a lake longer and wider, without any gain to that picturesque effect which mainly depends on form, combination, and colouring. In the peculiar nature of its scenery, too, England may be said to stand alone.

> Corn-waving fields, and pasture green, and slope
> And swell alternate; summits crowned with leaf,
> Grove encircled mansions,—the church, the farm, the mill,
> And tinkling rivulet,—

distinguish even the most uninteresting districts, which sometimes make up for their deficiency in the higher order of natural beauty, by more striking events in their history, or by monastic or castellated remains of a more attractive character. Nor must

we lose sight of local and national attachment, which cast an indescribable charm over all. So much for the "picturesque" or topographical side of the subject. Our limits will not permit us to attempt even a bare enumeration of the wonders of art, which have elevated this country to the highest rank amongst nations, else we could dwell at length on the field presented to the traveller in search of information,—on the manufacturing and commercial establishments, the dockyards and arsenals, ports, mines, canals, bridges, railroads, and other public works, which contribute to our prosperity, and are eminently calculated to instruct the inquiring mind.

Having thus slightly glanced at the profitable nature of *home tours*, let us proceed to our immediate subject, and request the reader to accompany us to the source of the "sylvan Wye."

PART I.

PLINLYMMON—SOURCE OF THE WYE—LLANGURIG—RHAYADYR.

THOU sylvan Wye, since last my feet
Wandered along thy margin sweet,
I've gazed on many a far-famed stream,—
* * * *
But none, to my delighted eye,
Seemed lovelier than my own sweet Wye,
Through meads of living verdure driven,
'Twixt hills that seem earth's links to heaven;
With sweetest odours breathing round,
With every woodland glory crowned,
And skies of such cerulean hue,
A veil of such transparent blue,
That God's own eye seems gazing through.

THE "pleased Vaga," as the Wye is poetically termed by Pope, takes its rise from a spacious hollow near the summit of Plynlimmon, a dreary mountain which attains an altitude of 2463 feet, on the borders of the counties of Cardigan and Montgomery, about fifteen miles from that fashionable watering-place, Aberystwith. The lower parts of the mountain are covered with soft mossy turf, and stunted heath, but often broken with rugged and extensive bogs, which render the ascent dangerous and difficult*. In other places the surface is entirely overspread with large loose stones, or white-coloured rocks, which give it a singular appearance on approaching its base. The summit consists of two peaks, on each of which are piled a pyramid of loose stones, called in the language of the country, *Carnedd*, or *Carneddau*. Similar heaps of stones are common on the neighbouring mountains, and in many other places in Wales. It has been supposed that they are sepulchral monuments erected by the Britons in honour of their military heroes, but it seems more probable that those on Plynlimmon were formerly used as beacons, as they might have been seen from ten counties. In 1401, the renowned chieftain, Owen Glendower, posted himself on this mountain with a small body of men, awaiting the arrival of his vassals and friends from various parts of the principality, and from whence he frequently descended and harassed the adjacent country. The entrenchments he threw up may still be traced. The blade of a British spear or pike made of brass, was found in a bog near this spot some years ago. The views from the summit in clear weather embrace a wild and extensive range of landscape; exhibiting mountains rolling, as it were, over each other in the most sublime forms and beautiful hues. In the north appears Cader Idris, and the lofty region of Snowdonia; the hills of Salop and Hereford may be seen to the east and north-east; and on the west the bay of Cardigan, and a dim outline of the coast of Ireland. After a copious fall of rain, the cataracts which descend with headlong fury down the sides of the mountain, add considerably to the grandeur and wildness of the scenery. This "hill king" of Cambria is best known, however, as the parent of no less than five streams or rivers, whence is derived the name *Pum*, five, and *Luinon*, springs, or fountain. The most important of these is the Severn, which rising in the north-east of the same group of mountains, (for Plynlimmon consists properly of three mountains piled together into one gigantic mass,) after a course of about two hundred miles, pours its waters into the sea below Bristol. The WYE, or *Gwy*, which in Celtic signifies a river, issuing from the southern side of the mountain, falls in a narrow streamlet several hundred yards nearly perpendicular, till gradually increasing by the union of several small springs, the overplus of the surrounding morasses, it soon forms a cataract, rolling with amazing rapidity over a rocky channel. The other rivers, the Rheidal, the Llyffnant, and the Fynach, though considerable streams, are of minor importance.

* At a small roadside inn at Eisteddfa Gurrig, a guide can be obtained, and from whence the mountain is generally ascended.

The WYE, (says Gilpin,) after dividing the counties of Radnor and Brecon, passes through the middle of Herefordshire; it then becomes a second boundary between the counties of Monmouth and Gloucester, and falls into the Severn a little below Chepstow. The exquisite beauty and grandeur of the scenery which in many parts adorn its shores in almost endless variety, is scarcely to be equalled. Such is the sinuosity of its course, that between Ross and Chepstow, a distance not exceeding seventeen miles in a direct line, the water passage is thirty-eight. Along the whole of this distance, the poet Gray truly observes, that its banks are a succession of nameless beauties.

The beauty of these scenes arises chiefly from two circumstances; the *lofty banks* of the river, and its mazy course; both of which are accurately embodied by the poet†, when he describes the Wye as *echoing* through its *winding* bounds. It could not well *echo*, unless its banks were both *lofty* and *winding*‡.

Let us now commence our matter-of-fact tour. The progress of the Wye from its source to LLANGURIG, a distance of about ten miles, is through a naked and dreary country, with undulating hills in the background. Mr. Roscoe observes, in his delightful *Wanderings*, that the village is honoured in all travellers' note-books with the cognomen of "wretched." There is only one very indifferent house of entertainment, but now that there is a prospect of the *Upper Wye Tour* becoming appreciated as it ought, we agree with Mr. Roscoe that Llangurig will no doubt at an early period afford superior accommodation. Poor as the village is, the scenery is wild and extremely magnificent, so much so, indeed, that Nicholson speaks of it as "exceeding the powers of description." The hamlet stands on the north bank of the river, surrounded by towering mountains, the lower portions of which are partially covered with wood, and relieve the hitherto monotonous tone of the landscape, the eye having previously been accustomed to dwell chiefly on the sullen and savage sterility of Plynlimmon.

The scenery from Llangurig to Rhayadyr, especially on approaching the latter, is highly interesting; the river being confined by close rocky banks, and having a considerable declination, the whole is a succession of rapids and waterfalls. The Nanerth rocks, for nearly three miles, form a fine screen to the north bank. The trees and shrubs which overhang the eddying pools and rapids in many places, add considerably to the picturesque character of the scenery.

RHAYADYR, a straggling, but rather a curious specimen of a Welsh town, has little to recommend

† Pope. ‡ GILPIN'S *Observations on the river Wye.*

it, save its beautiful situation. It stands on elevated ground on the east bank of the Wye, which, after leaving the Nanerth rocks, makes an easy bend under woody hills. The view from the bridge, which has a very fine arch, is singularly grand, the river here falling over a ledge of rugged rocks and forming a magnificent cascade, from which the town derives its name Rhayadyr Gwy; *Rhayadyr*, signifying a cataract, and *Gwy*, a river. There is excellent fishing above Rhayadyr, the river abounding with fine trout, and in the Summer season it is much resorted to by the lovers of the piscatory art. The town is divided into four streets, intersecting each other at right angles, a plan common in most of the old Welsh towns. In the reign of Henry the Eighth, the quarter sessions were held here, but were soon afterwards removed, chiefly on account of the inability of the place to afford necessary accommodation for the judges. In the centre of the town stands the hall, a square building erected about 1768. The castle, which stood on a nook of the Wye, at the extremity of Maes-bach, a small common in the neighbourhood, was anciently of considerable importance. Of the superstructure nothing now remains. It is said to have been erected by Rhys, prince of South Wales in the time of Richard the First, and afterwards burnt in 1231 by Llewellyn ap Jorwerth.

CHAPTERS ON CORONATIONS.

No. II.

THE REGALIA.

Among the Regalia of England there is no article possessing more historical interest than King Edward's or, as it is commonly called, St. Edward's Chair, in which the sovereign is seated when the crown is placed upon his head. It is in shape similar to the high-backed chairs which were fashionable in England about a century ago; its height is six feet seven inches, its depth twenty-five inches, and the breadth of the seat measured withinside is twenty-eight inches. At the height of nine inches from the ground there is a ledge which supports the celebrated Stone of Destiny, which Edward I., or Longshanks, brought from Scotland as a memorial of his conquest of that country. This stone was originally the royal seat of the kings of Ireland; they called it *Liafail*, or "the stone of destiny," and attributed so much importance to it, that they named the island in honour of it, Innisfail, or "the island of destiny." According to the monkish legends, this was the identical stone which served Jacob as a pillow when he saw the miraculous vision in Bethel; they tell us that it was brought by Gathol, king of the Scuths, or Scots, to Brigantia, a city of Gallicia in Spain, and that it was removed from thence to Ireland by Simon Brech, the leader of a body of Scots, about seven hundred years before the birth of Christ. From these invaders Ireland received the name of Scotia, which it retained until within a century of the English invasion. Fergus, a descendant of Simon Brech, being compelled to leave Ireland in consequence of civil wars, led a body of emigrants to Argyleshire, and brought with him the stone of destiny, which he deposited at Dunstaffnage, about three hundred years before the birth of Christ. All his descendants were installed on this stone seat, and it was believed that when the rightful heir took his seat, the stone emitted loud and harmonious musical sounds, but that it remained silent whenever a pretender attempted to be crowned.

The real history of the stone is scarcely less curious than that ascribed to it in the legend. We learn from sacred history that the earliest altars were made of unhewn stone: indeed, the Chaldee word for altar, signifies literally, "stones orderly erected," and God himself directs Moses, "If thou wilt make me an altar of stone, thou shalt not build it of hewn stone: for if thou lift up thy tool upon it thou hast polluted it." (Exod. xx. 25.) This reverence for unhewn stones led to their being used as idols. We read of the children of Israel in the age of their corruption, that "they set them up images and groves in every high hill and under every green tree." (2 Kings xvii. 10.) Here the Hebrew word *Matzebah*, which our translators have rendered "image," properly signifies "a stone pillar." So also in the Levitical law: "Ye shall make you no idols nor graven image, neither rear you up a standing image, neither shall ye set up any image of stone in your land to bow down before it: for I am the Lord your God." (Levit. xxvi. 1.) Here the word *Matzebah*, rendered "standing image," signifies simply a stone pillar. In consequence of these perversions, the erection of the Matzebah was entirely prohibited, when Moses recapitulated the law to the children of Israel.

The worship of stone pillars was very common in the East; Clement of Alexandria declares that rude stones were the object of adoration in those lands where the art of statuary was not understood; Pausanius mentions several such pillars in Bœotia, where they were probably introduced by the Phœnician colonists; and Arnobius declares that the pagans of Northern Africa consecrated pillars of stone for idols so late as the fourth century of the Christian era.

Superstition connected stone seats with the administration of justice, which was regarded as a right delegated to rulers by the gods. This custom lasted to a very late period; a marble bench anciently stood at the upper end of Wesminster Hall, where the king in person, and at a subsequent period his chief judges, heard the pleas of those who complained of injury, and hence the chief criminal court of the realm is now called the Court of King's Bench.

The Irish stone of destiny appears from the ancient records of Ireland to have been an altar, an idol, and the throne of the kings; and it was therefore viewed with three-fold reverence. A remarkable prophecy identified its fortunes with those of the royal line of the Scots, which is thus given in the old monkish rhymes:—

> Ni fallat fatum,
> Scoti, quocunque locatum
> Invenient lapidem,
> Tenentur regnare ibidem.

That is:

> Or Fate is false, or where this stone is found,
> A king of Scottish race will there be crowned.

It was on account of the importance attached to this prophecy that Kenneth removed the stone from Dunstaffnage to Scone, where, for more than four hundred and fifty years, it was used as a throne at the coronation of the Scottish kings. Its removal to England was felt by the entire people of Scotland as a national humiliation, and they stipulated for its restoration at the treaty of Northampton, A.D. 1328. Writs for sending it back were issued by Edward the Third, but from some unexplained cause they were never executed.

When James the First ascended the throne of England great importance was attached to this fulfilment of the prophecy connected with the stone of destiny, and so deep was the impression thus produced on the minds of the Scottish people, that in the reign of Queen Anne it reconciled many to the Union, who would otherwise have opposed that measure.

KING EDWARD'S CHAIR.

A close examination of the stone induces us to believe that it is a block of red sandstone, containing a more than ordinary proportion of ferruginous matter; it certainly is not an aërolite, as several authors have asserted. Its dimensions are, twenty-two inches in length, thirteen in breadth, and eleven in depth. At each end are two short iron chains.

The chair itself was anciently decorated with carving, gilding, and painting, but its beauty has been long since effaced. At modern coronations it is covered with cloth of gold, but we could wish that the decorations of this very interesting relic of antiquity should be restored as nearly as possible according to the ancient pattern.

The AMPULLA, or Golden Eagle, in which the holy oil for anointing the kings is preserved, is a vessel of pure gold, in the shape of an eagle with expanding wings, nearly seven inches in height, and weighing about ten ounces. The old historian Walsingham, in his account of the coronation of Henry the Fourth, connects the use of this Ampulla with a very singular legend:—Henry the Fourth, according to the historian, was anointed with the identical holy oil which the blessed Virgin gave to St. Thomas the Martyr, archbishop of Canterbury: that is, to Thomas à Becket, whose extreme pride and insolence form so remarkable a part of the history of Henry the Second. Becket received this extraordinary boon when he was in exile, and the Virgin assured him, that whatever kings of England should be anointed with this oil, they would become merciful rulers and distinguished champions of the church. It may be curious to remark, that Walsingham, or, as he is more frequently called, "the worthy monk of St. Alban's," is not very scrupulous respecting the purity of the language he attributes to the Virgin, for the word which we have rendered "champions," literally signifies boxers, or heroes of the prize-ring,—a kind of champions not very well suited to the defence of the church.

This oil, preserved in a golden eagle and stone jar, was long lost, but it was at last miraculously brought to light. While Henry, the first duke of Lancaster, was waging war in foreign parts, the aforesaid eagle

THE AMPULLA.

and jar were delivered to him by a holy man, to whom the place of its concealment was divinely revealed. He gave it to the most noble Prince Edward, commonly called the Black Prince, who deposited it in the Tower of London. It was enclosed in a box secured with more than ordinary care; but the box itself by some accident was put astray, so that the holy oil could not be used at the coronation of Richard the Second. In the year of grace 1399, Richard the Second, having made an inquisition into the treasures bequeathed to him by his ancestors, found the eagle and jar, together with a manuscript in the handwriting of "St. Thomas of Canterbury," containing the prophetic description of all the advantages and blessings that the kings of England would derive from being anointed with this holy oil. He was so struck with the enumeration, that he wished the ceremony of his coronation to be repeated, and applied to the archbishop of Canterbury for the purpose. The prelate obstinately refused, declaring that unction was a sacrament, which, like the sacrament of baptism, could not be administered a second time. Richard took the eagle and jar with him when he made his unfortunate voyage to Ireland, and on his return resigned them to the custody of the archbishop of Canterbury at Chester, saying, "It is manifestly the will of God that I should not be anointed with this holy oil; that solemn sacrament is reserved for some more favoured monarch." The archbishop kept these precious treasures until the usurpation of Henry the Fourth, who was the first English sovereign anointed with this precious oil.

The legend of the Ampulla used at the coronation of the French kings is still more extraordinary. It is said to have been brought from heaven by a dove to St. Remy, when he was performing the ceremony of the coronation of Clovis. Hincmar, in his life of St. Remy, thus narrates the legend:—

> And behold a dove, fairer than snow, suddenly brought down a phial in his mouth full of holy oil. All that were present were delighted with the fragrancy of it, and when the archbishop had received it, the dove vanished.

Another historian, quoted by Menin, is rather more particular in his relation:—

> When he that bore the chrism was absent and kept off by the people, lo! suddenly no other doubtless than the Holy Spirit appeared, in the visible form of a dove, who carrying the holy oil in his shining bill, laid it down between the hands of the minister.

The oil of this mystic vessel was declared by the Romish priests to be undiminished by use, and this was gravely put forward as a standing miracle until the time of the French Revolution. At the coronation of Charles the Tenth, the priests had the folly to proclaim in the public papers that a phial containing some of this invaluable unction had been preserved from the destruction of the rest of the Regalia, to anoint the head of a monarch so devoted to the interests of the Romish church.

The original Ampulla given to Thomas à Becket

was not destroyed with the rest of the Regalia in the time of the Commonwealth; but it was renovated for the coronation of Charles the Second, and at the same time a new spoon was prepared into which the oil is poured by the consecrating prelate. The spoon, like the eagle, is of chased gold, and is adorned with four large pearls in the broadest part of the handle.

Kings were anciently anointed on the head, the bowings of the arms, on both shoulders, between the shoulders, on the breast, and on the hands. There are only three distinct anointings in modern coronations, on the head, breast, and hands, which were said by Becket to indicate glory, holiness, and fortitude. Great importance was attached to this unction, for Shakspeare represents Richard the Second declaring on the invasion of Bolingbroke:

> Not all the water in the rough rude sea,
> Can wash the balm from an anointed king.

The rich IMPERIAL CROWN of gold with which the monarchs of England are crowned, is still called St. Edward's crown, though it was actually made for the coronation of Charles the Second, the more ancient crown having been stolen and sold in 1642. It is embellished with pearls and precious stones, as diamonds, rubies, emeralds, and sapphires, and has a mound of gold on the top, enriched with a fillet of gold embellished also with precious stones. Upon the mound is a cross of gold garnished with jewels, and three very large oval pearls, one fixed on the top, and two others pendent on the ends of the cross. It is composed of four crosses pattée, and as many

ST. EDWARD'S CROWN.

CROWN OF STATE.

fleurs de lis of gold, all embellished with precious stones. From these crosses arise four circular bars or arches, which meet at the top in form of a cross; having at their intersection a pedestal, on which is fixed the mound already mentioned. The cap within this crown is of purple velvet, lined with white taffeta, and turned up with ermine. On the day of coronation the jewels and precious stones belonging to the Crown of State, so called because it is worn by every sovereign coming in state to parliament, are taken out, fixed in collets, and pinned into the imperial crown: their places are supplied by mock stones, when the ceremony of the coronation is concluded.

Since the time of Charles the Second a very rich crown of state, to be worn by the sovereign only at the coronation dinner in Westminster Hall, is prepared for every succeeding king or sovereign queen. This is very rich, being embellished with several large diamonds, and a great number of pearls; but it is most distinguished by a very large ruby, set in the middle of one of the four crosses, and estimated at the value of ten thousand pounds, and also by the mound's being one entire stone of a sea-green colour, known by the name of an aquamarine. The cap is of purple velvet, lined with white taffeta, and turned up with ermine, like that of the imperial crown.

A queen-consort wears a circlet proceeding to her coronation, and is crowned with ST. EDGITHA'S CROWN; which is so named in honour of Edgitha, the consort of Edward the Confessor.

QUEEN'S CROWN

QUEEN'S CIRCLET.

The queen's circlet of gold is richly adorned with large diamonds, and has a string of pearls round its upper edge. The cap is purple velvet, lined with white taffeta, and turned up with ermine richly powdered.

The queen's crown, or the crown of St. Edgitha, was originally manufactured for Catherine, the consort of Charles the Second. It is a rich imperial crown of gold, set with very valuable diamonds, intermixed with other precious stones and pearls. It is composed of crosses and fleurs de lis, with bars and arches, and a mound and cross on the top, like the crown of St. Edward, only smaller and lighter. The cap is of purple velvet, and turned up with

QUEEN EDGITHA'S CROWN.

ermine, or minever pure, richly powdered. The crown of St. Edward is used solely for the coronation of a sovereign queen, and cannot be worn by a queen consort.

The Saxon kings of England wore crowns like those of other nations, which were at first only simple circlets of gold. King Egbert first adorned the fillet, or circle, with radiant points, similar to the crowns worn by the emperors of the East; and King Edmund, surnamed Ironside, tipped the points with pearl. William the Conqueror surmounted the circle with points and leaves, the points being much higher than the leaves, and each of them was tipped with three pearls; on the top of the cap, or tiara, was a cross pattée. William Rufus adorned his crown with points only, which were all tipped with pearls. The crown of Henry the First was adorned with fleurs de lis only; these fleurs de lis appear to have been originally designed to represent the heads

of lances, and to have been borrowed from some military decorations of the ancient Germans. Maud, Queen of England, enriched her crown with leaves and points alternately, the leaves being higher than the points; and this custom remained unvaried until the accession of Edward the Third. He enriched his crown with fleurs de lis and crosses pattée. Edward the Fourth was the first English monarch who wore a close or arched crown; it was decorated with fleurs de lis and crosses pattée, and arched with four bars. Henry the Seventh and Henry the Eighth had their crowns composed of fleurs de lis and crosses pattée, with two arches, embellished with pearls and precious stones; and this form has been since continued.

The ancient French crown was a circle of gold enamelled, of eight fleurs de lis, encompassed with eight arched diadems, bearing at the top a double fleur de lis, which is the crest of cognizance of France.

The Spanish crown was a circle of gold, richly decorated with jewels and precious stones, and adorned with eight leaves. It was not closed with arches until the marriage of Philip the Second with Queen Mary of England, when four arches were added, being double the number of those in the English crown. Those of Bohemia, Poland, Denmark, and Sweden, are similar to the Spanish; but no foreign crown has the velvet tiara or the ermine of the English crown.

The crown of Hungary, worn by the emperors of Austria, is double: the lower crown is similar to the Spanish; the upper is composed of sixteen plates of gold, from which two arches arise, having in the centre a cross, richly decorated at the extremities with pearls. The sixteen plates are enamelled with busts of Jesus Christ, the evangelists, and the apostles; so also is the flat part of the arches, the whole being enriched with pearls, diamonds and precious stones.

Before concluding this part of the subject, it may be as well to describe the crowns or coronets worn by the princes of the blood and the English nobility. The crown of the Prince of Wales, when there is an heir apparent to the throne of Britain, is a circle of gold, surrounded with four crosses pattée and as many fleurs de lis, set alternately. From the two centre crosses an arch arises, adorned with pearls, and surmounted by a ball and cross: within the coronet is a cap of crimson velvet, lined with white sarcenet, and turned up with ermine. The Prince of Wales has also another distinguishing ornament, *viz.*, a simple coronet, surmounted with a plume of three ostrich feathers, and having the motto, "*Ich Dien*," that is, "I serve." This cognizance was first assumed by Edward, Prince of Wales, commonly called the Black Prince, after the battle of Crecy, A.D. 1346, where, having killed John, king of Bohemia, he took from his head such a plume, and put it upon his own.

The CORONET of the Princes of the Blood-royal is composed of a circle of gold, richly chased, having on the edge two crosses pattée, two strawberry-leaves, and four fleurs de lis. Within the coronet is a crimson velvet cap, lined with sarcenet, and turned up with ermine. On the top of the cap there is a rich tassel of gold and spangles.

The coronet of a Duke is a circle of gold, richly chased, having on the edge eight strawberry-leaves, which most probably were originally lance-heads, all of equal height; within is a crimson velvet cap, topped by a gold tassel, and turned up with ermine of one row. The coronet of a Marquis is a circle of gold, set round with four strawberry-leaves, and as many pearls, on pyramidal points of equal height, alternately. The cap is the same as that of the duke. An Earl's coronet has eight pyramidal points, with as many large pearls on the tops of them, placed alternately with as many strawberry-leaves, lower than the pearls. The cap and tassel are the same as before. Coronets were first assigned to earls in the reign of Henry the Third. The Viscount has only pearls, without any limited number, placed on the circle itself all round. The cap and tassel are the same as before. Coronets were first assigned to viscounts in the reign of James the First. The coronet of a Baron has only six pearls set round the circle, at equal distances; before the reign of Charles the Second barons wore simply a crimson cap, turned up with white fur, but that monarch assigned them coronets, and at the same time issued warrants permitting the peers of Scotland and Ireland to use coronets similar to those worn by noblemen of the same rank in England.

MATERIALISM.

THE doctrine of the *materialists* was always, even in my youth, a cold, heavy, dull, and insupportable doctrine to me, and necessarily tending to atheism. When I heard with disgust, in the dissecting rooms, the plan of the physiologist, of the gradual secretion of matter, and its becoming endued with irritability, ripening into sensibility, and acquiring such organs as were necessary, by its own inherent forces, and at last rising into intellectual existence, a walk into the green fields, or woods, by the banks of rivers, brought back my feelings from nature to God. I saw in all the powers of matter, the instruments of the Deity: the sunbeams, the breath of the zephyr, awakened animation in forms prepared by Divine Intelligence to receive it; the insensate seed, the slumbering egg, which were to be vivified, appeared like the new-born animal, works of a divine mind; I saw *love* as the creative principle in the material world, and this love only as a divine attribute. Then, in my own mind, I felt connected with new sensations and indefinite hopes, a thirst for immortality; the great names of other ages, and of distant nations, appeared to me to be still living around me; and even in the funeral monuments of the heroic and the great, I saw, as it were, the indestructibility of mind.

These feelings, though generally considered as poetical, offer a sound philosophical argument in favour of the immortality of the soul. In all the habits and instincts of young animals, their feelings or movements may be traced in intimate relation to their improved perfect state; their sports have always affinities to their modes of hunting or catching their food, and young birds even in the nest show marks of fondness, which, when their frames are developed, become signs of actions necessary to the re-production and preservation of the species. The desire of glory, of honour, of immortal fame, and of constant knowledge, so usual in young persons of well-constituted minds, cannot, I think, be other than symptoms of the infinite and progressive nature of intellect—hopes, which, as they cannot be gratified here, belong to a frame of mind suited to a nobler state of existence.—SIR HUMPHRY DAVY.

The proper study of mankind is man.—POPE.

IF the proper study of mankind is man, it is proper only so far as it may conduce to our own advancement in righteousness, by making us acquainted with that weakness and corruption of our nature, which self-love is for ever labouring to conceal. Should we forget to apply to our own individual cases, the observations which we make in the case of others, our knowledge will not only be barren of improvement, but may even serve to engender a censorious spirit; and increase that pride and presumption which we know too frequently attends the mere possession of speculative knowledge. Our own personal improvement is the centre towards which all reflections upon the nature and actions of man should converge; and whatsoever tends to unfold and bring to light any weakness lurking in the heart, should be received on our parts with all the readiness and impartiality which becomes creatures who are conscious of their responsible condition, and of that higher and eternal destiny which is to succeed this probationary life! —J. S. M. ANDERSON.

RUNJEET SINGH,

CHIEF OF LAHORE.

In the revolutions of barbarians have neither the importance nor the historical relations of civilized countries, they are at least more frequent, and their perpetrators as blood-thirsty. When man has thrown aside the ties of religion and morality which bind him to society, he exhibits, in an awful manner, the horrors of unrestrained passion; and, whether he be savage or civilized, his motives for action are the same, as well as their consequences.

Ambition and the lust of power prompt men to rebel: they unite under the guidance of some one powerful mind, the possessor of which sways the rebels to his own will, and by them serves his own purposes. Such a man is Runjeet Singh, the present Chief of Lahore, whose history is altogether extraordinary, as well as that of the individual who mainly contributed to place that Indian chief in his present powerful position. The facts which we are about to detail are we believe quite new to English readers: they are obtained from the French newspapers of a few years back, and their authenticity is probably unquestionable.

In the extensive continent of Asia, towards the thirtieth degree of North latitude, and between British India and Persia, there is a country, concerning which little is known, although it is extensive, rich, and has a large and industrious population. The form of this country is that of a delta, by the junction of the rivers Indus and Sutledge: the north of this country is bounded by part of the Himalayah mountains; the population is warlike and enterprising, and the country is called the kingdom of Lahore.

About forty years ago Lahore had no existence as a kingdom. A number of petty princes, who lived by pillage and rapine, but independent of each other, divided among themselves the provinces of this beautiful country. They were constantly engaged in mutual war, and conquering and being conquered in quick succession, the peaceful arts could find neither introduction nor encouragement amid the horrors of this rude warfare. This rich country, therefore, situated so admirably between two great empires, in the centre of a vast continent, with numerous navigable streams, and natural frontiers, was torn with internal dissensions, and incapable of assuming any political importance, for want of some tie which would unite its discordant elements; for want, in fact, of a chief, or even of a usurper, who could conquer the whole of the country, and govern it when conquered.

At the present time this country has a chief, who has blended into one kingdom all the dissentient states which formerly composed it. This country is now a kingdom with about twenty millions of inhabitants: it has a considerable and well-disciplined army, numerous founderies and arsenals, a regular government, finances in a flourishing state, and its importance is such that it is the friend and ally of the British government in India.*

This kingdom owes its origin and its present state of wealth and power chiefly to two of those extraordinary men who from time to time appear among the scenes of human affairs, and so materially influence the condition of mankind. One of these men is Runjeet Singh, King of Lahore and Cachmire, the conqueror of all the petty sovereign princes who formerly harassed the whole country between the Indus and the Sutledge; the other is a Frenchman, Allard by name, one of the officers of the old imperial army of Napoleon, and at the present time commander-in-chief of the military forces of Runjeet Singh.

About two years ago General Allard visited his native country, bringing with him his wife, a native of Lahore, and his children, for the purpose of placing the latter under proper tutors, so as to be educated in the religion of their fathers, and according to the customs of civilized Europe. While at Paris the general had an interview with the editor of the *Journal des Débats*, and communicated to him the following particulars:—

General Allard is about fifty years old, of the middle size, of a handsome figure: the expression of his face is mild but dignified; his language is short and precise, his voice agreeably modulated, his discourse modest. He wears a long white beard and mustachios. His hair is gray, but his whole external appearance indicates the vigour of a mature age: his eyes are bright and piercing: he is devoted to the military profession, and seems formed for command.

General Allard was formerly attached to the staff of Marshal Brune. He quitted France at the downfall of Napoleon, with the intention of going to the United States of America, and had already paid for his passage on board one of the frigates of the Union, when he met with an Italian officer, who, like himself, was about to seek his fortune in a foreign clime, and was induced by the Italian to give up his American trip, and go into Egypt. He did so; and met with but a cold reception from the Pacha, and no employment. He then went into Persia, and at Ispahan he was heartily welcomed by the Abbas-Mirza, who conferred upon him the title of colonel, and treated him as such: he promised him the command of a regiment, but failed in his promise. Fortunately for Allard there was at the court of Ispahan an old king of Cabul, whose brother had usurped his throne and deprived him of his sight: this king, an experienced old man, told Allard that in Cabul he would be sure of welcome and employment. Cabul is situated between Persia and the principality of Cachmire. Allard went there, and found in fact that there was a king who could well appreciate the services of an European officer. But scarcely was Allard established in Cabul, when he learnt that there dwelt, two hundred leagues further on, a skilful and bold chief, who was employing all his energies and resources in founding a kingdom. This was the kind of chief that Allard desired to serve: he went therefore to Lahore, and found Runjeet Singh, who was then a rajah. Allard met with welcome and employment from the rajah, whose confidence he soon obtained: he placed under Allard a few men, who, being disciplined according to the military system of France, became the nucleus of the rajah's future army. Next, Allard disciplined a hundred men, who were thus instructed in the duties of military officers. Then he organized a regiment; then a brigade; then a division; his reputation increasing with the number of his soldiers, and the confidence of the rajah keeping pace with the growth of his army. This army soon became the terror of the neighbouring princes, who disputed with Runjeet Singh the sovereignty of the kingdom of Lahore: they were all in succession beseiged in their fortresses, attacked in their retreats, beaten in open field, or vanquished in the defiles and fastnesses of their mountains. At length none resisted; and at the end of a few years Runjeet Singh was the only king of this country. It was the triumph of discipline over the rude warfare of the barbarian, and

* See Malte-Brun's *Universal Geography*, vol. iii., p. 52.

Allard was loaded with honours and with wealth: he had a palace at Lahore, a crowd of servants and slaves, and a regiment for his escort. He married a princess, a relation of the king, and was finally named commander-in-chief of the armies of the kingdom: he became, next to Runjeet Singh, the most important, powerful, and absolute personage in this extensive country. Such is the fortune of General Allard.

After an absence of sixteen years, Allard wished to revisit his country. His wife did not accompany him to Paris: she remained at Saint Tropez, a sea-port of the Mediterranean, on the coast of France. This lady was shocked at French customs and manners: she thought it highly indelicate that French women should allow their faces to remain uncovered, and constantly expressed a strong desire to return to her native country.

The condition of the women in Lahore is nearly the same as in Mohammedan countries generally. They are brought up in an entire ignorance of all kinds of useful knowledge: most of them do not even know the use of the needle. They live in an absolute seclusion, and never see the sky, but from the flat roofs of their houses; or, when they ride out, through the open tops of their palanquins, which are enclosed on all sides; so that, as General Allard says, they never see the horizon. They pass their time at the toilette, arranging their black hair, and adorning their persons: they tinge their hands and feet with a red dye. Within doors they wear no covering for the feet: their slippers are made of silk, embroidered with gold; these they leave at the door of the apartment, which is covered with the richest carpets in the world.

The children receive no mental instruction: they learn neither reading nor writing. Their knowledge of good and evil is left to natural instinct. This system probably explains why it is that Lahore is overrun with robbers and bandits. At eight years of age the boys are taught to ride on horseback, to guide an elephant, and to fire the musket; and in a few more years they are excellent recruits for General Allard.

Runjeet Singh is not more learned than his subjects; he does not value knowledge for its own sake; but he has the sense and discretion to appreciate and apply for his own advantage that of others. He is a man about fifty-six years of age; very ugly, blind with one eye, robust, active, dissipated, warlike, of tried courage, and of wonderful endurance. When General Allard wished to quit Lahore, in order to visit France, the king was altogether dissatisfied: he long resisted the wishes of his favourite. "Let me at least detain thy children," said he at length to the general, "and then I shall be sure of thy return." "My children!" exclaimed Allard: "it is on their account that I wish to visit France; for there only can they be educated in the knowledge and practice of my own religion." At these words the king no longer resisted. "Since thou speakest to me of thy religion," said he, "I can no longer oppose thy will: this belongs only to thy conscience, and every one ought to follow the faith which he approves, and he is bound to obey its commandments. Thou mayest depart." Whilst he pronounced these words, he became greatly moved. He remained in deep thought for some time, as if he hesitated to give the general the farewell embrace: then casting himself into his arms and weeping violently, he dismissed him, saying, "Farewell, go in peace!"

Runjeet Singh is not therefore altogether a barbarian. General Allard states that he has often seen his ministers, some of whom belong to the faith of Mohammed, rise up in the midst of the council, interrupt their master, and retire to the extremity of the hall, in order to perform some ceremony, due to a particular hour just arrived. The king never makes any remark, but waits with admirable patience until such orisons are finished.

Runjeet Singh has many expensive tastes, one of which, if fully gratified, would ruin any other than an immensely rich man. He is attached to the chase, as conducted in the East. He has an ardent passion for precious stones and fine horses. He learnt one day that there was a very fine horse in one of the neighbouring provinces, in a part of the kingdom of Cabul not yet brought under his dominion. Spies were sent out in order to inform the rajah of the existence of the horse, and the exact spot where it was to be found. These two points being ascertained, a troop of ten thousand men were sent to seize the animal: they traversed many provinces, spent much money, fought their way to the stable of the horse, and did not rest until it was added to the stud of the rajah. He also obtained possession of probably the finest diamond in the world by similar means. A neighbouring petty king was said to be the possessor of a diamond, which had belonged to the Great Mogul, the largest and purest that was ever known. This of course was coveted by Runjeet Singh, and accordingly he invited the prince to his court, and being master of his person, he demanded his diamond. The king pretended to resist; but after many manœuvres he yielded possession. The delight of Runjeet Singh was extreme; he gave it to a lapidary to mount it; but what was his surprise and fury when the man informed him that this pretended diamond was only a piece of crystal! Runjeet Singh caused the palace of this king to be invested: his soldiers ransacked it from top to bottom. Their researches were all in vain for a long time: at length a slave of the king having sold the secret of his master, the diamond was found among the ashes of a fire. Runjeet Singh has ever since worn it as a trophy of victory, set in a bracelet of gold. On state days he wears, in chaplets round his head, many other diamonds of extraordinary size and beauty. It is said that the jewels of Runjeet Singh are the richest and finest in the world; and the riches and magnificence of his court and palace, the splendour of his travelling equipage, and of all his equipments, exceed probably all that we hear of among oriental princes.

We will devote a second paper to our account of this extraordinary person and his dominions.

THE GLOW-WORM.

WHEN on some balmy-breathing night of spring
The happy child to whom the world is new,
Pursues the evening moth of mealy wing,
Or from the heath-bell shakes the sparkling dew,
He sees before his inexperienced eye,
The brilliant glow-worm like a meteor shine
On the turf-bank, surprised, and pleased, he cries
"Star of the dewy grass! I make thee mine."
Then, ere he sleeps, collects the moistened flower,
And bids soft leaves his glittering prize unfold.
And dreams that fairy lamps illume his bower;
But in the morning, shudders to behold
His shining treasure viewless as the dust;
So fade the world's bright joys to cold and blank disgust.

CHARLOTTE SMITH.

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THE TOWN OF CLOYNE, IN IRELAND.

THE ROUND TOWER, AT CLOYNE.

CLOYNE is the name of a small town in the south of Ireland, situated in the barony of Imokilly, and the county of Cork. It stands at a short distance from the eastern shores of Cork harbour, and is described as straggling and miserable; it consists principally of one street, the houses of which are of an inferior description. It is a place of considerable antiquity, as is likewise the bishopric of which it is the seat, its cathedral having been founded by St. Colman, in the sixth century. The old name of the town is *Cluaine*, which signifies in Irish "a cave," and it is supposed to have been thus called, in consequence of the number of natural caverns and subterranean passages existing in the limestone-rock, of which the district is composed.

The town of Cloyne is situated on a small limestone eminence, gently rising in the midst of the valley, through which there might once have been a communication from Cork harbour to the sea; and this eminence might have been an eminence surrounded by water, and afterwards, on the water partially drying up, by a deep bog, and at present by rich and, in general, well-improved meadows, to which the plantations about the church and see-house, with the round-tower, appearing everywhere above them, give a good effect. On this spot St. Colman, before the year 600, is supposed to have founded his church; and the security of it must have received no small addition from the circumstance of a cave, which is on the most elevated part of it, extending in various branches under ground to a great distance. In those unsettled and barbarous ages, caves of this sort were resorted to by the natives on the first appearance of an enemy, and the invaders seldom being able to make a long stay, the wives and children of the peasants, and perhaps even their cattle, would remain in tolerable safety, till the country could assemble in their defence. It is certain that places of refuge of this sort were looked upon as of so much necessity, that on some of

the Hebrides we find artificial caves constructed for the purpose; and when nature had provided one so deep and roomy as this, the rude inhabitants of the times would as naturally graze their flocks and build their huts in its neighbourhood, as in latter days they raised their cottages under the shelter of a Norman castle. This idea will also receive confirmation from the name of the town *Cluaine*, signifying a cave in the Irish language.

At Cloyne a branch of the Fitzgerald family, distinguished by the title of Seneschals of Imokilly, had formerly two or three castles; they are the chief proprietors of the adjacent district, from which indeed their title was derived. The title was first bestowed in 1420 by James Earl of Ormond, Lord-Lieutenant of Ireland, on Lord Desmond, after whose death it was assumed by the head of his descendants, resident in the district. There is an account related of a skirmish which took place at Cloyne, between the Seneschal of Imokilly and Sir Walter Raleigh, and in which the skill and intrepidity of Raleigh were remarkable. Raleigh afterwards accused the seneschal of cowardice on the occasion; and such were the manners of the times, that Lord Ormond and Sir Walter more than once publicly challenged Sir John of Desmond and the seneschal, both of whom were in open rebellion, to decide the matter by single combat. In the year 1601 the Lord Deputy Mountjoy, on his return from the siege of Kinsale to Dublin, by way of Waterford, went out of his road to pay a visit to Cloyne, where he slept on the 7th of March, and was received by Master John Fitz-Edmonds, who held the town and manor-house in fee-farm, and who "gave cheereful and plentiful entertaynment to his lordship, and all such of the nobilitie, captaines, gentlemen, and others as attended upon him;" when the lord-deputy, "as well to requite his perpetual loyaltie to the crown of England, as also to encourage others in the like, did honour him with the order of knighthood."

St. Colman, the founder of the Bisopric of Cloyne, was the son of Lenin, the chief bard of Aedh, King of Munster; he died in the year 604. There are few records of the see till after the arrival of the English. About the year 1327, it appears to have become so impoverished, that King Edward the Third wrote to Pope John the Twenty-second, with the view of effecting an union between it and the see of Cork, which was likewise at that time much reduced. The attempt was at the time unsuccessful; but a century afterwards, the two sees, happening to be simultaneously vacant, were consolidated and granted to Bishop Jordan. This union continued until 1638, when a separate Bishop of Cloyne was consecrated by Archbishop Usher. During the civil wars the see was for some time vacant; but in 1660 it was again united to Cork and Ross, and this second union lasted till 1678, since which period Cloyne has been a separate bishopric. By the Act of 1833, however, relative to the temporalities of the Church in Ireland, Cloyne is to be reunited to Cork and Ross, as soon as the latter sees become void.

About the time of the Reformation the see of Cloyne suffered severely in its temporalities; in this respect it was not singular, every bishopric in Ireland being then exposed to similar injury. Ecclesiastical property in that kingdom was, to use the expression of Mr. Crofton Croker, "in a manner annihilated." Bishoprics, colleges, and tithes were divided without mercy amongst the great men of the time, or leased out on small rents for ever to the friends and relations of the incumbents, insomuch that "there was not," says Harris, "one bishopric in the province of Cashel that had not the print of the sacrilegious paw, upon it." Many Irish bishoprics, such as Aghadoe, Kilfenora, &c., never recovered from this devastation. The bishopric of Ferns was left not worth one shilling; Killala, the best in Ireland, was left worth only 300*l.*; Clonfert, 200*l.*; the archbishopric of Cashel, 100*l.*; Waterford, 100*l.*; Cork, only 70*l.*; Ardagh, 1*l.* 1*s.* 8*d.* Cloyne, situated at a distance from the capital, an appendage to the neighbouring see of Cork, and without head or guardian, had very little chance of escaping in the general plunder. The outlying estates were seized by the nobility near them; and the demesne of Cloyne itself passed, by a fraudulent process, into the hands of the powerful family of the Fitzgeralds.

In the reign of Charles the First, some steps were taken to put a stop to the plunder of the Irish Church by laymen, and even, to a certain extent, to compel restitution. When Strafford went over as lord-deputy in 1631, he found the church in "a state of ruin;" many of the bishoprics, as Ferns, Lismore, and Cloyne were entirely destroyed, and the revenues of the others reduced to a trifle, the churches pulled down, or in a state of desolation, and the glebes and tithes in the hands of laymen; so that one nobleman in the western part of the kingdom, (the Earl of Clanricarde,) had no less than one hundred livings in his own possession; and the Earl of Cork, in the south, besides all the landed estates of Lismore and the college of Youghall, had impropriated all the livings belonging to both of them.

The cathedral of Cloyne is described as a "small heavy building, without any pretensions to ornament." Bishop Bennett, who was an eminent antiquary, supposes it to have been built between the middle and the close of the thirteenth century; it has no mouldings of the zigzag, nail-headed, or billetted kind, nor round-arched windows, which distinguish what is called the Saxon, or rather Norman architecture, before the introduction of the Gothic in the time of Henry the Third.

It is not evidently (says the learned prelate,) so late as that time, nor, on the other hand, has it the splendid arch or oak-leaved ornaments, so common in the middle of Edward the First's reign, therefore it is not so late as that period. I should be inclined to fix the era of its building to the latter years of the first of these princes, or the beginning of the reign of the last. The windows, though since altered, were evidently of that sort called lancet-windows, which were so common in the time of Henry the Third: see the great west window and that of the south transept; the latter on the outside, are additional arguments for the date I have chosen: as is also the circumstance that, about this time, three prelates out of four were Englishmen, in whose country monastic and cathedral architecture was in high estimation.

In the cemetery of this cathedral the tombstones are very numerous, owing, as Sir Richard Colt Hoare says, to the attachment which the Catholics still bear throughout Ireland to the ancient churches. Bishops Johnson and Woodward are buried there. "May the heavens be his bed," exclaimed the poor woman who showed Mr. Crofton Croker the interior of the church, on pointing out Bishop Woodward's monument; "when he died, the poor lost a good friend." Near it is a large and rather injured tomb of black marble, which originally belonged to the Fitzgeralds, and has been converted by the Earls of Thomond to their own use since the decline of the Fitzgerald family.

In the year 1776, when the cross-wall at the entrance of the choir was erected by Bishop Agar, the workmen digging deep in the nave to lay the foundation, they discovered a row of graves of rather singular construction, consisting of brick cells, each of which was exactly suited to the size and shape of the body contained in it. Curiously enough one of these

bodies was found to end at the shoulders, and to be unaccompanied by any of the skull bones. "It is, therefore, not improbable," as Bishop Bennett suggests, "that the head of the owner may have been fixed on Cork gates in the times of turbulence, as they appear in the print given us in the *Pacata Hibernia*, to be full of such kind of trophies."

The chief object of interest, however, at Cloyne is its Round Tower,—one of those singular monuments of antiquity, concerning the origin and use of which there has been so much controversy among antiquaries. It is not our intention, upon the present occasion, to give a general account of these remarkable structures, which are the only edifices of unknown date in Ireland deserving of notice as works of art, and, therefore, the only evidence of the skill and knowledge of the early inhabitants of that country. We shall content ourselves here with observing that, as to the period of their erection, they are "as *ould* as the hills" in the belief of the peasantry; and as to their use, they are variously supposed by different classes of antiquaries to have been,—the abodes of solitary anchorites,—the receptacles of a "sacred fire," worshipped by the primitive inhabitants of Ireland, after the fashion of the east,—places of temporary penance,—watch-towers erected by the Danes,—steeple-houses, and belfries.

The Round-Tower at Cloyne stands in the street, on the side opposite to the church, and, as usual, near its western front. This singular structure sustained considerable damage from lightning in the middle of the last century; its height is stated to be 92 feet, and the thickness of its wall 43 inches.

Adjoining the town is the Bishop's Palace, a plain edifice, which was built in the early part of the last century by Bishop Crowe. It stands in a picturesque demesne, in which are the entrances to some of the natural limestone caverns abounding in this district. The ancient name of this spot was *Monelusky*, or "Field of Caverns;" and the names of the neighbouring fields and grounds, says Sir R. C. Hoare, "speak the savageness of this place in former times." Thus *Knocknamodree* is the "Hill of the Gray Dog, or Wolf;" *Park na Drislig*, the "Field of Briars;" *Monecranisky*, the "Meadow of the Wild Boars," &c. On the north of the town is a hill called *Bohermore*, or the "Great Highway," from a tradition that a road passed over it from the sea in the south to the sea on the north of the kingdom.

In 1805 a curious discovery was made in one of the caverns in the neighbourhood of Cloyne. A quarryman accidentally let his crow-bar fall through a fissure in the limestone-rock; he widened the aperture and descended in search of the instrument into a cavern, in which he was surprised to behold a human skeleton, partly covered with exceedingly thin plates of stamped or embossed gold, connected by bits of wire, and likewise several amber beads. One of these plates was preserved, the rest of the gold was sold and melted in Cork and Youghall. The bones of the skeleton were eagerly sought after by the superstitious peasantry, who pronounced them to be those of St. Colman, and accordingly carried them away for charms. There is said to be a tradition in the country, of a battle having been fought near the spot in a very remote period, and of four kings having fallen in the conflict.

In the neighbourhood of Cloyne are two seats deserving of notice; one of them is Castle Mary, formerly called Carrig Cotta, which is supposed to be a corruption of Carrig Croith, or the Rock of the Sun,—a name derived from a cromlech, or Druidical altar, still to be seen not far from the house. This remain of paganism consists of a rough and massive stone, twelve feet in length; one end elevated about six feet from the ground by two smaller stones, from which its name of Cromlech, signifying a bending or inclined stone, is derived. Close by it is a smaller stone or altar, supported in a similar diagonal position by a single stone. There is a tradition, that nothing will grow under either of these altars, an opinion that originates from the total absence of verdure, incident to a want of sufficient light and air. The top of the larger altar was richly covered with the plant familiarly called the Wood Geranium, (*Geranium Robertianum*, or Robert's Crane's Bill,) the light feathery leaves and delicate pink blossoms of which formed a pleasing contrast to the solemnity and breadth of the altar.

The plantations of Castle Mary (says Mr. Croker,) are venerable and extensive, arranged in the taste of the last century. Few situations can be more imposing or romantic than that of the Druid's Altar, the descent to which is overshadowed by some luxuriant ash-trees, of singularly beautiful form and growth; the gigantic size attained by some surprises the English traveller, and their long, graceful branches, reaching to the ground, produce an effect not unlike the famed banyan groves of the east. Whilst Miss Nicholson was sketching the altar, a figure emerged from this depth of foliage, in costume which, had it been a tint whiter, might well have passed for that of a Hindoo: but the innocent deception was soon destroyed by the irresistible accent in which the following exclamation was uttered, after coolly surveying that lady's work, and the subject of it.—'Och! fait and sure the darlint lady isn't pulling down the ould stones may be! and as like as themselves it is, long life to her! well to be-sure, and a power of trouble to be taking—*a wisha* God help us!'

Another remarkable seat in the neighbourhood of Cloyne is that of Rostellan, belonging to the O'Briens; it is situated on the eastern shore of Cork harbour, of which it commands a noble view. The present house is built on the site of a castle of the Fitzgeralds, and contains a small armoury. "The sword of the great Brian Boru, my lord's ancestor, King of Munster, your honour, and *his fowling-piece!* are there to be seen," said one of the gate-keepers who accompanied Mr. Croker through the grounds, and seemed anxious to display the wonders of the place to strangers. It is hardly necessary to remind the reader, that fire-arms were not introduced into Ireland till some centuries after Brian Boru was in his grave. But similar anachronisms are very common in Ireland, where anything ancient, wonderful, or curious, is without hesitation referred to Fion Mac Cuil, (the Fingal of Ossian,) St. Patrick, or Brian Boru. On an elevated terrace, near the water, is a statue of Admiral Hawke, "the position of which," says Sir R. C. Hoare, "rather surprised me, as the back of this celebrated warrior was turned upon the very element on which he had acquired such immortal honour.

I was told (he adds) that the following circumstance gave rise to placing the figure in this position. Upon the defeat of the French fleet, commanded by Conflans, in the year 1759, the city of Cork ordered a statue to be cast of the English admiral, Hawke; but on its completion, some objections were made to the expense by the citizens; upon which the noble Inchiquin said, 'that he would pay for it,' which he did, and, as a rebuke, placed the admiral's figure on a pedestal, with his back turned towards the ungrateful city. Mr. O'Brien, the present inhabitant of the place, and who, on the death of the Marquis of Thomond, succeeds to the Earldom of Inchiquin, told me a most singular anecdote relating to this same statue, and which, in a less enlightened age than the present, might have been considered as ominous:—'That the admiral's right arm, which grasped a sword, fell off on the very day that the French landed on the coast of Ireland at Bantry Bay.'

CORONATION ANECDOTES. No. II.

RICHARD I.

In a moneth mirie, Septembre the gynnyng
Baudwyn of Canterbirie com to coroune the kyng
Richard at Londoun, upon a Sonenday
At Westmynstre, tok the crown.

SUCH is Langtoft's brief memorial of a coronation, the first of which we have anything like a full account in the ancient chronicles. It will be seen, from the description, which we have compiled principally from Hoveden and Matthew Paris, that the forms and observances were nearly the same as those of more modern times.

Duke Richard having made all necessary preparations for his coronation, came to London, where he assembled the archbishops of Canterbury, Rouen, and Tours, who had given him absolution in Normandy for waging war against his father after he had taken the cross as a crusader. The archbishop was also present, with all the bishops, earls, barons, and nobles of the kingdom. When all were assembled in the prescribed order, the ceremony commenced. First, the archbishops, bishops, abbots and clergy, wearing their square caps, and preceded by the cross and holy-water bearers and deacons burning incense, went to the door of the royal bed-chamber, and led the duke in solemn procession to the great altar in the church of Westminster. Four barons marched in the midst of the prelates and clergy bearing four large wax tapers lighted; after them came two earls, one bearing the sceptre and cross, the other the rod and dove. Then came three earls bearing swords in golden scabbards taken out of the royal treasury. They were followed by six earls and barons, bearing a coffer (probably of relics) over which, the royal mantle and vestments were spread. Next followed the earl of Chester, bearing on high a golden crown, beautifully studded with gems. Next came Duke Richard between two bishops, over whose head four barons carried a silk canopy supported by gilt-headed spears. When they reached the altar, Richard swore in the presence of the clergy and people on the holy Gospel and the sacred relics, that he would observe peace, honour, and respect, all the days of his life, to God, holy church, and its ordinances. He likewise swore that he would administer justice in rectitude to his people, that he would abolish all evil statutes and customs, and that he would enact good laws.

His attendants then stripped him to his trowsers and shirt, the latter of which was left open between the shoulders on account of the anointing. Baldwin, archbishop of Canterbury, who wore rich buskins of cloth of gold, then anointed the king in three places on the head, between the shoulders, and on the right arm. A consecrated linen coif and a cap of estate were then placed upon his head, and he was vested with the royal robes, the dalmatic and the tunic; the archbishop then delivered him a sword, to restrain the enemies of the church. Two earls then buckled on his spurs, and invested him with the pall of state. After which Baldwin conjured him in the name of God, and forbade him to take the crown, unless he were firmly resolved in his heart and soul to observe all the promises to which he had sworn.

Richard replied that, relying upon the Divine assistance, he would perform all that he had sworn; after which, taking the crown from the altar, he delivered it to the archbishop, who placed it upon the king's head, and also put the sceptre in his right hand, and the rod in his left.

Thus crowned, he was led by the bishops and barons, preceded by the tapers, cross, and swords, to his throne. Mass was then sung, and, at the offertory, two bishops led the king to the altar, where he made an oblation, and the like was done after the benediction. When mass was concluded, the king was led by two bishops, preceded as before, to the choir, where having assumed a lighter crown and robes, he then went to the coronation banquet. There the archbishops, bishops, earls, and barons, ranged according to their dignities, feasted sumptuously; and wine was supplied so plenteously, that it streamed down the floors and walls of the palace. Those who held lands by tenure of services at the coronation were in attendance, and performed their duties.

These festivities were sullied by a sanguinary and disgraceful riot. Numbers of Jews had flocked to England in the reign of Henry II., where they were honourably protected by that liberal and enlightened sovereign. Grateful for such unusual favours, they assembled at London to subscribe among themselves, in order to make Richard a splendid present on the day of his coronation. Unfortunately Richard was persuaded by some of the bigots who surrounded him; that the Jews were accustomed to practice magic on sovereigns during the time of the coronation, and he therefore issued an edict, prohibiting any Jew from entering the church while the ceremony was performed, or appearing at the palace during dinner. Curiosity overcame prudence; several of the most considerable Jews mingled with the crowd, and gathered round the gates of the palace. One of them, endeavouring to force an entrance, was struck in the face by an overzealous Christian; this signal roused the fanaticism of the multitude: a general assault was made upon the Jews, who fled in confusion towards the city. Some wretches, eager for plunder, raised a cry that the king had given orders for the extermination of the unbelieving Jews, and as this was by no means improbable, when the king was a crusader, it received implicit credit. The city mob, swelled by the multitudes who had come from the country, atttacked the houses of the Jews, which the inhabitants defended with great courage and obstinacy. The enraged populace, when night came on, finding that they could not break into the houses, hurled brands and torches on the roofs and through the windows. Conflagrations burst forth in various parts of the city, which consumed not only the houses of the Jews, but those of the Christians adjoining. The king, hearing of the disturbance, sent Ralph de Glanville, the chief justiciary, and other noblemen, to disperse the mob, but they were unable to control the infuriate rioters, and were forced to fly for their lives. Towards morning the rabble quarrelled among themselves about the division of the booty, and mere weariness, together with anxiety to secure their plunder, induced them to disperse. Richard caused several of the ringleaders and most notorious malefactors to be apprehended the next day; they were hanged as a terror to others, a proclamation was issued, taking the Jews under the royal protection, and the tranquillity of the city was restored. Few persecutions were felt more bitterly by the Jews than this massacre, as is manifest from the pathetic terms in which it is recorded by Rabbi Joseph.

"And King Henry fell sick, and died of grief; for the Lord raised up evil from his own house, when he was by the Castle Chinon.

"And he died, and his son Richard reigned in his stead, in the year four thousand nine hundred and fifty, which is the year one thousand one hundred and ninety;

and they put the royal crown upon his head in the city of London, in the royal palace, which was without the city. And there gathered themselves together in that place, much people from Yzarphat and from the isles of the sea. And also the Jews, the heads of the people, were among those who came to bring gifts unto the king. And the people murmured against them, saying, 'The thing is not right, that the Jews should look at the crown wherewith the priests crowned him;' and they pursued them and reviled them. But the king knew nothing of it. And a report was heard in the city, saying, 'The word came forth from the mouth of the king to destroy the Jews.' And they arose suddenly against them, and pulled down their houses and their towers, and killed of them about thirty men. And some of them slaughtered their children and themselves, that they might not abide that bitter day: there fell slain, Rabbi Jacob from Orleans, for the sake of the holiness of his Creator, on that fearful day. But of all this King Richard knew nothing, till he heard the voice of the multitude; and he said, 'What is this to-day?' and the doorkeeper said, 'Nothing; only that the boys rejoice, and are merry in heart.' And it came to pass, when he heard this great evil, his anger was much kindled, and his wrath burned within him. And he commanded, and they tied the doorkeeper to the tails of the horses, and dragged him, and cast him about in the markets, and in the streets, until his spirit departed, and he died. Blessed be He who giveth vengeance! Amen."

After his return from captivity, Richard had the ceremony of his coronation repeated, at the request of his nobles, who thought such a form necessary to remove the disgrace of imprisonment.

John.

John ascended the throne, to the prejudice of the hereditary rights of his nephew Arthur, by virtue of a form of election. The archbishops, bishops, earls, barons, and other the estates of the realm, being assembled in the church of Westminster, May 27th, 1199, Hubert, archbishop of Canterbury, addressed them in these memorable words:—

"Hear all men! It is well known to your wisdom, that no man hath any right of succession to this crown, unless he be elected for his own merits by the unanimous consent of the kingdom, with invocation of the Holy Ghost; after the manner and similitude of Saul, whom God set over his chosen people, though he was neither the son of a king, nor sprung of a royal line; and in like manner after him, David, the son of Jesse, the former because he was brave, and suited to the royal dignity, the latter because he was humble and pious. So that he who surpasses all within the realm in fitness for royalty, should preside over all in dignity and power. But if any one of the family of the deceased sovereign should excel others, his election should be the more readily and cheerfully conceded. Wherefore, as our late sovereign Richard died without issue of his body, and as his brother, Earl John, now present, is wise, brave, and manifestly noble, we, having respect both to his merits and his royal blood, unanimously and with one accord elect him to be our sovereign."

This was the most decisive form of election since the Conquest, and it is so commemorated in Langtoft:

> The arsbishop Hubert of Canterbirie the so
> Com with gode hert to do the solempnitie
> At Westmynster thorgh assent of erle & baroun
> To that I ore ment[a] Hubert gaf the coroun.

The people responded with shouts of "Long live the king!"

[a] To him I before mentioned.

THE HOUSE I LIVE IN.

No. VI.

NUMBER OF BONES AND JOINTS IN THE HUMAN FRAME.

The *cranium*, or that part of the head which contains the brain, consists of eight different bones. There are fourteen bones of the face, besides thirty-two teeth. Then there are four very small bones in each ear, and one at the root of the tongue. Thus the whole head above the neck contains sixty-three. The neck has seven; but as these form the upper part of the spine, they are usually reckoned with those of the body.

Here let us stop to comment on the simple, yet effectual, contrivance for increasing the security of the brain. Had the cranium, or brain-case, been composed of one entire bone, instead of several, fractures would have followed almost every injury on its surface, and such fractures as do occasionally take place, would probably be of greater extent and of corresponding danger.

The spine, or back-bone, contains twenty-four pieces, called *vertebræ;* and between these and the lower extremities are four bones more. There are twenty-four ribs; that is, twelve on each side, and a breast-bone, or sternum, down the middle of the front. Thus, that which is commonly called the body, contains fifty-three bones.

The upper extremity, including the hand, arm, *clavicle*, or collar-bone, and *scapula*, or shoulder-blade, consists of thirty-two pieces, or sixty-four on both sides. Each lower extremity includes thirty bones; and thus both together make sixty, besides the small *sesamoid** bones.

Now, if we add together these several numbers, we shall find that a complete human skeleton contains no less than two hundred and forty bones! Who would suppose this, from a mere view of the human figure, either while standing, or with the limbs in motion! We now see that it has a great many joints within it, and of course a great many bones. At every part of the body where the bones meet, there is more or less of motion (excepting at the junction of the several portions forming the head, face, teeth, and hips), and these may all be moved, nearly at the same instant. Thus there are in the human frame about a hundred and eighty joints.

We may, indeed, add to this number the small sesamoid bones, which are found in the thumbs and great toes of older persons, and somewhat resembling the knee-pan in shape, though very diminutive in size. Of these there are often two in each large joint of the great toe, and as many in the large joint of each thumb. Adding these, then, to the two hundred and forty, we shall have for the whole number of bones in the human frame, two hundred and forty eight.

Some make the number about two hundred and sixty; but in this fourteen sesamoid bones are included. It should be remembered that the number of sesamoid bones greatly varies in differen individuals, though nearly all adult persons hav some of them, and some individuals have them in other parts of the body besides those already mentioned. They are hardly ever larger than half a pea. In addition, it may be mentioned, that some individuals have two or more supplementary bones in the skull, called *ossa wormiana;* these, when they occur, are of an irregular shape, and seldom larger than small Windsor bean.

Besides all these, the breast-bone, the ossa inno-

* See *Saturday Magazine*, Vol. XI., p. 115.

minata, and many other bones of the body, are in young persons composed of several pieces, and some of them are often not very strongly united even when they become older.

Some few individuals are occasionally met with, who have a still greater number of bones; but these may generally be considered as diseased persons. A bony or chalky substance is often formed in the flesh of those who have the gout, and some of the gristly parts of the body—I mean the cartilages and ligaments—occasionally become *ossified*, that is, converted into a substance resembling bone, as do also small portions of the great arteries, or tubes which convey the blood. In some diseases, also, the bones become soft, and readily bend, owing to a deficiency of the earthy matter of which they are composed.

Occasionally persons are met with who have six fingers on each hand, or six toes on each foot, and sometimes both; but these supernumerary fingers and toes do not always have bones in them.

SKELETONS.

WHEN all the bones of a human being, or of any other animal, are put together, and fastened to each other by pieces of wire, the whole is called a *skeleton*.

There is, too, another kind of skeleton, but it is not so commonly met with; nor is it so convenient for use. It is made by stripping off all the soft parts of the body, excepting the ligaments; these are suffered to remain, and the whole is thoroughly dried. This is called a *natural skeleton*, in contradistinction to the former, which is called an *artificial skeleton*.

ANATOMY.

THE study of the nature and structure of the bones alone, is called *osteology*; that of the muscles, *myology*, &c. But as most people who study these, go farther, and learn also the shape and structure of the heart, the lungs, the brain, the blood-vessels, and, in fact, all parts of the body, some more general name seems necessary for what they do. Therefore we say of those who study all parts of the human body, just as it appears when the soul leaves it in death, the bones, muscles, tendons, brain, nerves, heart, blood-vessels, lungs, skin, &c., that they are studying ANATOMY.

PHYSIOLOGY.

PHYSIOLOGY is something more than all this. It is the study of the living animal;—how the heart, the brain, the eye, the ear, the muscles, the bones, and every other part, acts. David, the inspired psalmist, felt this, when, meditating on the curious structure of his own body, he exclaimed, "I am fearfully and wonderfully made." King David, however, had probably never seen a complete human skeleton, or even had much insight into the interior of the human frame; for in those days it was deemed improper to employ the bodies of men for the purposes of anatomical research, instead of which, the remains of the brute creation, particularly dogs, and other domesticated animals, were used. Hence many of the technical terms by which the various parts of our complicated structure are designated, though now appearing fanciful and erroneous, were at the time of their invention more correct, and the analogy much more obvious.

For many years past, we have been accustomed to consider it not only as allowable, but highly proper, and even necessary, to examine and dissect the human body after death, as it is by such means alone that the true structure of the human machine can be understood and explained, and the knowledge of its various derangements acquired. That the most intimate acquaintance with the different branches of *Anatomy*, *Physiology*, and *Pathology*, is highly requisite for those to possess who undertake to cure or to relieve the various "ills which flesh is heir to," is admitted by all who are competent to form an opinion on the subject.

I will here take the opportunity of defining the three words above-mentioned. By the word *Anatomy*, is meant a knowledge of the structure and proportions of the human, or of any other animal body; by *Physiology*, is meant a knowledge of the functions which the various parts of the body perform during health; and by *Pathology*, is understood an acquaintance with all those changes and alterations in the structure or functions which are effected by *disease*.

In these papers, it is my intention to describe a little both of anatomy and physiology, but into pathology I shall not enter, as that will be unnecessary for the general reader. Heretofore I have treated principally of anatomy; the remaining chapters will embrace a large proportion of physiology, combining, as we proceed, the two subjects together, showing the structure of a part, and at the same time pointing out its uses, by which method, after what has before been explained, a tolerably correct idea of the subject will be acquired.

BONES AND SHELLS.

BEFORE closing this chapter, I would observe that, although, except in very extraordinary cases indeed, the bones of deceased *human* beings are left to decay in the grave, the bony parts of the inferior animals are turned to great account in the domestic and useful arts. The handles of common knives, and innumerable little articles in every-day use, are made of bone; from which, also, some valuable products are obtained by the aid of chemistry. Ground bones make excellent manure for certain descriptions of land, and thus not only become valuable to the farmer, but furnish a beautiful illustration of the laws of nature, by which the constituent elements of the animal frame are made to contribute to the growth of vegetables, upon which human existence so greatly depends.

Ivory is another kind of bone, for it is the tooth of the elephant; as is also that useful substance, whalebone, which is part of the structure of the enormous jaws of the whale. From the *horns* of animals, combs, lanterns, whip-handles, and many other articles, are made, while the covering of the tortoise, and the shell of a certain species of oyster, furnish us with those beautiful substances, tortoise-shell and mother-of-pearl.

The shells and bones of animals not only serve as a support to the softer parts, but also as a firm defence. What would become of the tender frame of the poor tortoise, the lobster, the crab, the oyster, and many other living things, if they were not covered over, and protected, as with a shield, by a hard buckler of shell? The soft parts of the human body, which are most essential to life, are in many instances well defended in the same manner by the solid, unyielding materials which envelope them. As, for instance, the brain, the spinal marrow, the lungs, the heart, and the liver.

Now a portion of the shell of every animal is formed of lime. There is not so much difference between the bones of man and the shell of the tortoise, or the lobster, as may be supposed, though the colour is very different. A very large proportion of the lobster-shell is lime; in the tortoise-shell the quantity is much less; and horn contains but very little. Bones, as I have before observed, contain a large proportion of this earth.

RUNJEE SINGH,
CHIEF OF LAHORE.
No. II.

Runjeet Singh knows nothing of reading, nor do his sons. He is nevertheless the chief administrator of justice in his kingdom, and General Allard states that his judgments are on all occasions just and prompt. The civil state is thus organized: each village has a chief or judge, who is empowered to decide minor questions: affairs of greater importance are decided by a judge whose jurisdiction is more extensive than that of the former. The next officer in rank is the king himself: the king is easily accessible, and any one of his subjects can plead his own cause before him. There is a guard at the gate of his majesty's palace, who announces the suitors. If the king cannot receive them, he says, "Come to-morrow." A child without a home, or a man without bread, can prefer his request to the rajah, and never fail of his application, if he should appear to be a worthy object of the king's bounty. He exercises wonderful judgment and sagacity in deciding between man and man, and he is rarely, if ever, deceived in his judgment.

According to the laws of the country the punishment of death is never inflicted. A criminal sometimes has his nose or his ears cut off, but never his head. It is also not uncommon to cut off the criminal's hands. In serious cases, and where the culprit has again committed the crime for which he has been already once punished, the tendon of Achilles* is cut through. General Allard saw an unhappy wretch who was condemned to this punishment. This was a robber, who had had his two hands cut off for highway robbery. Thus mutilated, this man did not the less continue the exercise of a propensity which was irresistible with him. To his right arm a lance was firmly tied, and the bridle of his horse to the left arm: thus he went on the highway, and robbed almost as successfully as before. He was at length arrested and conducted before the king, who inflicted the punishment upon him which we have already noticed. Thus doubly mutilated, the robber was compelled to rest satisfied with the pension which Runjeet Singh allows to all the unhappy wretches whom justice has put out of a condition of gaining their livelihood except at the expense of others.

Runjeet Singh has not abolished the frightful custom whereby the women burn themselves after the death of their husbands. Runjeet Singh is a very courageous man; but he has not the courage to oppose himself to this shocking superstition of his subjects. In Lahore the women allow themselves to be burnt upon the funeral pile of their husbands, as was a few years ago the custom throughout Hindoostan; until, to the immortal honour of the English, this custom was abolished. In Lahore the women think it an honour thus to be immolated. This is a superstition which we fear will long resist all attempts to abolish it; since it renders of no avail the most powerful instinct of human nature, that of self-preservation and the love of life.

General Allard has in vain attempted the abrogation of this custom. Hearing one day that the widow of one of his officers had resolved to burn herself with the body of her husband, he sent for her and tried to shake her resolution; but in vain. He then threatened to oppose with an armed force this wicked and senseless suicide. The next day all his officers met in a body at his house, and represented to him firmly, but most respectfully, that they were ready to obey him in every thing that related to the military service; but that they could not and would not accept his law and decision in a matter of conscience concerning their religion. This, of course, was not to be resisted, and the widow was burnt.

General Allard was present at one of these sacrifices. The victim was a young and beautiful woman. She approached the pile, tranquil in appearance; but her countenance betrayed the internal struggle between nature and mistaken duty. She spoke a few words which were greedily listened to by those around, and received as infallible oracles; being her last words, *norissima verba!* She was splendidly dressed and covered with jewels. She mounted the pile and stretched herself upon it in the midst of the joyous shouts of the assistants, and the noise of loud instruments of music: but one of the pieces of wood which formed part of the pile, stood higher up than the others; this incommoded her; she got up again, removed the carpet upon which she had been stretched, put the wood in its place, and again extended herself on the pile. A large mass of fagots was placed upon her, oil was poured upon them, and thus they were ignited. General Allard contemplated this horrible and strange scene from the back of his elephant. He saw this unhappy woman perish, and she did not utter a cry. The spectators appeared highly edified with the scene.

Another object of superstitious regard in this country is the Fakirs; who, in order to preserve during their whole lives the attitude of prayer, tie their arms to the branches of a tree, and remain in this posture during six months, until the muscles become so hardened and dried, that they can no longer change the position of their arms. Such men are esteemed holy, and are respected and fed by every one, so that they soon become fat. Some of the Fakirs preserve the use of their arms, and carry about with them a matchlock, whereby they plunder the travellers. The French traveller Jacquemont (many of whose relations have been confirmed by Allard), complains bitterly of these Fakirs, by whom it seems he was more than once robbed.

It is an extraordinary fact that General Allard has made the army of Lahore almost entirely French. Its uniform, weapons, military schools, and even its flag, are almost precisely those of the French army in the time of Napoleon. It has also its grenadiers, hussars, dragoons, and infantry; and even the words of command are given in French †.

Every recruit enters the army freely, and of his own accord: but the people being warlike, and the occupation of soldier being the best of all occupations, recruits abound. The only difficulty the recruiting officers have, is to know when and how to refuse the numerous offers made to them. So that, when the king of Lahore wishes to augment his army, he has only, we may almost say, to clap his hands, or to strike his foot upon the earth, and, thanks to his general, there come out battalions ready for the field.

The system of victualling the army is extremely simple: the government has nothing to do with it. The soldiers are paid so much per month, with which they are obliged to provide their own food, and forage for their horses. If they are at war, they are fol-

* The sinew which connects the heel of the foot with the leg.

† Jacquemont visited General Allard at Lahore. The latter entertained the traveller in a sumptuous manner. Jacquemont speaks particularly of the surprise and delight which he experienced one day, when seated at dinner with his host, at the sight of what appeared to be a French regiment, which surrounded their dining-hall, and performed a variety of evolutions at words of command spoken by the native officers of Lahore in the language of France.

lowed by a band of merchants and of dealers of every description, who travel at their own cost, and sell on their own account, without being responsible to the officers of the army; except that the latter exert a sufficient authority to preserve order in these travelling caravansaries. The horse-soldiers have servants mounted like themselves, who provide forage for the horses. The facility with which an army of many thousands of men arriving in a country, which appears to offer no resources, and where human creatures would appear likely to perish for want of provisions, finds itself well victualled in a few hours, is, according to the recital of General Allard, an astonishing thing to behold; but, this it is, that has enabled the troops of the king of Lahore to undertake such extraordinary excursions, and to march into lands almost entirely unknown to the geographer, without ever experiencing those privations, which in other countries, so completely destroy military discipline.

The only essential difference between the costume of the troops of Runjeet-Singh and those of France is, that the former still wear the turban, with their long hair interlaced with folds of cachmire. The men pride themselves upon their hair; they connect with it the idea of strength and power. They also greatly respect the beard; a man is not thought to be such without it: young or old the beard must descend in streams of ebony, or of silver, upon the breast. General Allard has a long beard, which, when he was in France, he turned back behind his ears during meals. His uniform is that of a French general; his head-dress, a light helmet with loops of gold, of an elegant and commodious form.

Duelling is not known in the army of Runjeet-Singh; the soldiers settle their disputes with their fists,—a brutal, and equally unchristian, method of adjusting differences.

After a few months' stay in France, General Allard set out on his voyage back to Lahore, taking his wife with him, and leaving his children to be educated in the land of his fathers.

Before concluding, we should do well to observe, that the foregoing account does not contain the first instance of European skill and science, effecting great changes in the condition of any particular part of the world. The sovereign of Cochin-China, who had been dethroned by a party of his own subjects, in the year 1747, was enabled, by the assistance of Adran, a French missionary, to form, in the European style, a fine army and fleet, with which he not only recovered his own kingdom, but subdued those of his neighbours, southward of the empire of China.

THE ESCULENT SWALLOW,
(*Hirundo Esculenta.*)

THE esculent swallow is found in China, where it builds its singular nest in the rocky caverns on the sea coast; its nest has the appearance of hardened jelly or isinglass, and is esteemed by the natives of China, and other parts of Asia, as a great luxury; it is employed by them in the preparation of soups and other made-dishes. Marsden, in his *History of Sumatra*, says there are two sorts of nests; the white, which are less common, and the black or dark-coloured, which are more frequently met with. Some persons, however, believe that the difference in colour arises from accidental causes, such as the mixture of the dark-coloured feathers of the bird with the substance of which the nest is composed; and this belief is partly borne out by the fact, that if the dark-coloured nests are soaked in warm water, they become much whiter in their appearance; but the natives themselves are strenuous in the belief of their being built by two different species of swallows. Marsden, from personal observation, believes that the white nests are more recent than the other sort, and that in this the whole difference lies.

THE ESCULENT SWALLOW.

In the small island called the *Cap*, near Sumatra, two caverns were discovered by the embassy of Earl Macartney, which contained an immense quantity of these nests; they were composed of very delicate filaments, united by a transparent viscous substance, much resembling the remains of those jelly-like animals, the medusæ, which are frequently found on the sea shore. The nests adhered to each other as well as to the sides of the caverns, and were placed in uninterrupted ranks. An esculent swallow, apparently of another species, is also found in great abundance in deep caverns at the foot of the highest mountains in the interior of Java. This swallow is said to occupy two months in the preparation of its nest. The inhabitants of Java, who employ themselves in collecting these nests, (which, on account of the situations in which they are found, is rather a dangerous employment,) never begin their work without having in the first instance sacrificed a buffalo, and repeated a number of prayers; they then anoint their bodies with a sweet-scented oil, and after performing other superstitious ceremonies at the entrance to the cavern, they prepare for their descent. The fact of these caverns being situated in the centre of the island of Java, and not on the sea-coasts, seems to militate against the opinion that the birds collect the substances of which they form their nests on the shore; their nests are placed in these caverns in horizontal rows, from 50 to 500 feet in length.

Near some of these caverns a tutelar goddess is worshipped, whose priest burns incense and lays his protecting hands on every person prepared to descend into the cavern. A flambeau is carefully lighted at the same time, with a gum which exudes from a tree in the vicinity, and is not easily extinguished by the subterranean vapours.

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SOME ACCOUNT OF CANTON. PART III

FORT ON THE RIVER, NEAR CANTON.

THE HONGS OR FACTORIES.

THE word *Hong* is used by the Chinese to designate a commercial establishment or warehouse; and by this name the European factories at Canton have been designated. The hongs extend along the bank of the river between seven and eight hundred feet; they extend backwards in depth a hundred and thirty yards, into a long narrow lane, on each side of which are confined the abodes of foreigners. To the eastward, the line of factories is bounded by a narrow ditch or inlet from the river, serving to surround a portion of the city-wall, and to drain that portion of the town. All the factories communicate with the river by wooden stairs, from which the tea and other commodities are embarked; and the space which they occupy is traversed by three thoroughfares, leading direct from the river,—namely, China Street, New China Street, and Hog Lane,—the latter being a narrow filthy passage, inhabited by low Chinese, who keep spirit-shops, into which they entice the sailors, and rob them.

"The range of factories or hongs belonging to different nations," says Mr. Bennett, "having flag-staffs, on which the national colours are hoisted, from sun-rise to sun-set, are fine buildings, more particularly those belonging to the East India Company, which are of greater extent than the whole of the others. Several weeping willows are planted about the open space near the river, in front of the factories. The English and Dutch hongs have neat gardens laid out for a promenade, in front of them; but the open space before most of the others forms the 'quarter-deck,' where, every evening, the European residents take their limited walk."

Mr. Abeel gives a very entertaining description of the appearance which the open space in front of the factories presents, at different hours of the day. He says, that it "is the rendezvous of multitudes of the natives, who assemble daily, to transact business, gratify curiosity, or murder time. It is level for a short distance, beyond which it stretches over a large pile of rubbish, deposited here after the desolating fire of 1822, and retained, notwithstanding numerous applications for its removal, as a lasting and growing nuisance to foreigners.

"As the morning opens upon this scene silence retires, and the ears of the stranger are assailed by a new and peculiar combination of sounds. Human voices of harsh, drawling tones, cries of confined dogs and cats, screams of roughly-handled poultry, notes of feathered songsters, some of them admirably gifted and trained, with, at times, an accompaniment of very unmusical instruments, all unite in this inharmonious concert. The occupations of the tradesmen are varied. Meat, fish, vegetables, fruit, drugs, manufactures; everything saleable is brought to this general market. A number convey their portable kitchens hither, and prepare such dishes as suit the palates and purses of this promiscuous concourse. Others plant their barber's shop, or its necessary apparatus, in a convenient place, and spend their leisure hours in lolling about and conversation. Those who frequent the place for trade are

probably less numerous than the groups of idlers, who pass their time in listening to stories, witnessing juggling tricks, attending the operations and lectures of empirics, gaping at objects of novelty, and too frequently endeavouring to obtain each other's money by gambling.

"When the sun is oppressive the crowd retires, with the exception of the hucksters, who intercept his withering beams by temporary tilts. The erection of tents is a liberty not sanctioned by law, or, rather, contrary to the oral prohibitions of the petty officers who have the square in charge. Consequently, when men of authority make their appearance, the scene suddenly changes. From the moment of alarm there is the most hasty despatch until everything is removed that militates against their orders; their exit appears to be regarded as the signal of re-erection, and all things speedily revert to their former state. Such a show of subjection, with real contempt for authority, when it opposes individual gain, is said to be a prominent feature of the nation."

It is during the latter part of the day that this place is the general resort; in the cool of the evening the crowd becomes most concentrated, and, as a consequence, the clamour is quite deafening. Yet, tumultuous as is the concourse, it is said to be very free from contention or breaches of the peace. The least appearance of an unlawful commotion calls forth a public officer, who resides for the purpose, in full view, and is exceedingly efficient in quelling a riot and scattering offenders. This functionary, if occasion should arise, summons to his aid one or two lictors, who, armed with scourges, and apparently vested with a large discretionary power in the use of them, soon compel the unruly to make a precipitate retreat. The guilty are frequently chased, and when caught, dragged along to the hall of justice by the pendant *queue*, which is cruelly drawn over the front of the head, and made to press the face towards the ground.

"In surveying this mass of accountable beings," says the American Missionary, "there are many points of great interest to the eye of Christian compassion and benevolence. Independent of the associations which are common to all the heathen, there are facts of importance peculiar to this daily throng. Great numbers of them can read, and are attracted by every publication that meets their eyes. It is customary to paste up advertisements in the most public places of the square and the streets, and the groups generally found, through the day, gathered around them, show their eagerness to catch at every piece of information. What a place for the operations of the press, sacred to the cause of the Redeemer!"

The front part or entrance to the factories is near, and almost parallel to the bank of the river, and the intermediate space forms a general thoroughfare for persons who require any communication with the hongs, as well as those who have to embark and disembark at the different landing-places in front of them. There is no regular thoroughfare from the suburbs to the river-side through the private hongs, for the doors at the end looking towards the suburbs are locked day and night, and the front entrances are open only during the day; but there are two intervening streets and a lane, inhabited by Chinese shopkeepers, namely, Old and New China Streets, and Hog Lane, which are the general thoroughfares during the day; these, however, are also shut at night, according to the Chinese custom.

Mr. Holman compares the foreign factories to a succession of private streets, with a few merchants residing in each, whose stores are contiguous to their dwelling houses. "Each hong has its respective designation; for instance, the first you arrive at on your right hand on coming up the river, where there is a landing-place directly in front of it, is called Creek Hong, in consequence of being next a creek that communicates from the river to the heart of the city. This creek is a great nuisance at high water to the neighbouring hong, for at such time it is covered with boats passing to and from the city, loaded either with merchandise coming in, or offal &c., going out. Other hongs crowd the bank as you advance, and are generally distinguished by the names of the respective nations whose flags they display. The English factory is best known by the name of the British hong, and is the most considerable of them all. From the advantage of its position it can at any time stop the general thoroughfare in front of the line of hongs: but this power is never exercised, except when there is a dispute with the Chinese, in which case the gates are strictly guarded to prevent the admission of obnoxious or turbulent persons. There is no Russian hong nor will the Chinese permit any ships of that empire to visit Canton for the purposes of trade, assigning as a reason, that Russia already carries on a trade with them on the frontiers of their own country, and that they cannot be allowed to trade in two parts of the Celestial Empire." Mr. Holman gives the following list of these establishments, with the intervening thoroughfares, in the order in which they appear to a person coming up the river.

1. Creek Hong, Magniac and Co.
2. Dutch Hong.
3. Dutch Factory.
4. British Factory.

HOG LANE.

5. Chow-Chow Hong.
6. Hired Factory.
7. Messrs. Russell and Co.
8. Imperial Hong.
9. Dent and Co.
10. American Hong.

OLD CHINA STREET.

11. Hong Merchants.
12. French Hong.
13. Spanish Hong.

NEW CHINA STREET.

14. Danish Hong

COMMERCE.

"The Chinese, considered as traders," says Mr. Macculloch, "are eminently active, persevering, and intelligent. They are, in fact, a highly-commercial people; and the notion that was once very generally entertained of their being peculiarly characterized by a contempt of commerce and of strangers, is as utterly unfounded as any notion can possibly be. Business is transacted at Canton with great despatch; and it is affirmed by Mr. Milburn, and by most of the witnesses examined before the late parliamentary committees, that there is no part of the world where cargoes may be sold and bought; unloaded and loaded, with more business-like speed and activity."

An American writer gives the following illustration of this:—"While our officers," he says, "were at dinner with Mr. Lattimer, Mr. L. left the table for a moment, and returned so soon that he was scarcely missed. He informed his guests that he had made a sale while absent, of opium to the amount of two thousand dollars, and assured them that the Chinese are remarkably expert in business. Shopkeepers, from whom you may buy the most trifling article, supply ships with cargoes, worth two hundred thousand dollars, and will contract to do so with all the necessary security, in the length of time he had been absent from the table. They will manage all the smuggling, if any be necessary; get all the chops for duties; and deliver the articles on board the ship at Lintin, Whampoa, or Macao!"

Canton is very ill-suited to be the emporium of the British trade with China. In the first place the climate is comparatively hot, and secondly, the difficulties of conveying commodities thither from the interior of the country is very great. Two grounds are assigned for the policy which the native government have adopted within the last century, of confining the trade to this port. One is the desire to keep at a distance from the capital the danger of disputes arising out of intercourse with foreigners; and certainly Canton is very nearly at the farthest possible distance from the capital. The other is a desire to obtain the largest possible revenue from internal duties on the transit of goods; these are known to yield a considerable sum. Sir George Staunton mentions a "very ingenious memoir," written by a gentleman, formerly holding the appointment of Inspector of Teas to the East India Company, in China; clearly showing, upon an accurate and detailed comparison, between the expense of conveying black teas from the country where they are produced to Canton, and that of their conveyance from thence to the port of *Fu-tcheou-foo*, the capital of the province of *Fo-kien*, that the privilege of admission to the latter port would have been attended with a saving to the East India Company of £150,000 annually, in the purchase of that description of tea alone, besides affording us the advantage of another opening for the introduction into China of our manufactures and productions. Fu-tcheou-foo is but a short distance from the sea, in that part of the province of Fo-kien which lies opposite to the northern extremity of the island of Formosa; the largest Chinese vessels can ascend the river Mingho, almost to the very walls of the city, which is built upon its banks.

BRITISH INTERCOURSE WITH CHINA.

"As regards China," observes Mr. Auber, "we resort to a country in which we have not a foot of ground, and where we are confined to one port, at which our permanent residence is doubtful. The habits, manners, and customs are quite foreign to our own. The laws of China have been compared to a collection of consecutive mathematical problems, with this additional circumstance of perplexity, that a just and entire comprehension of each section individually, requires

a general knowledge of those that follow no less than those which precede. Such laws are also frequently violated by those who are (appointed to be) their administrators and guardians; where their treatment of foreigners is proverbially contemptuous; and in their commercial dealings they have no scruple at imposition, if circumstances favour the practice. Such is the character of the people with whom we seek to maintain an intercourse. . . . . China has rejected every effort made by us, as well as by almost every other European state, to form a commercial intercourse with her, upon those principles which govern commercial relations in other countries."

Sir George Staunton remarks, that upon the commencement of the present commercial intercourse of foreigners with the empire of China, nothing so much contributed to render them odious, both to the government and to the people in general, as their apparent disposition and tendency, upon almost all occasions, to a state of anarchy and disorder. The casual and unconnected adventurers who first traded to China, were entire strangers to the habits, customs, and language of the natives, as well as irreconcileably different from them in respect to all their national characteristics. It was obvious that to maintain order among such persons, and to regulate their intercourse with the natives, the ordinary rules and routine of Chinese justice would be, in most respects, utterly inadequate. As far, also, as the Chinese were enabled to judge, these foreigners were wholly without any internal government or system of control and subordination peculiar to themselves, which might have been capable of supplying the place, or at least, of coming in aid of the national laws; and which might, accordingly, have been accepted by the local authorities in China, as a sufficient substitute for those laws, in all cases in which their partial suspension or relaxation in favour of strangers was found unavoidable. Under the existing circumstances, therefore, the Chinese government deemed it necessary to supply the deficiency by the enactment of various new regulations and restrictions; and these were framed, as might naturally have been expected, with little regard to the feelings or interests of individuals who were not yet sufficiently powerful and united to command respect, nor sufficiently guarded and blameless in their general conduct to overcome prejudices and conciliate esteem. Thus, although the Chinese government did not absolutely prohibit foreign commerce, they resolved to provide against every hazard of ill consequences from its toleration, by the adoption and enforcement of the most jealous and vexatious precautions.

By the strict letter of these regulations, the continued residence of foreigners in China from year to year was totally forbidden; and during even the short period for which they were allowed to remain on shore, for the necessary purposes of their trade, they were required strictly to confine themselves to the small district which was allotted to them in the suburbs of the city of Canton. As a further security against turbulence and disorder, it was ordered that all foreign ships should be disarmed of their guns and other warlike stores, and that such articles should be retained in the custody of the government during the stay of the ships in port, and restored only at the moment of their departure. This order, though it has probably been but seldom enforced, and that only at a very early period of the trade, appears, nevertheless, to this day, unrepealed upon the Chinese statute-books In a printed collection of the edicts of the Emperor Këën-lung, (whose reign closed in 1795,) there is one which quotes this order; and after animadverting on its neglect, directs that it may be duly enforced in future.

Instead of foreigners being allowed to engage in anything like a free trade and intercourse with the natives generally, the whole of the foreign trade at the port of Canton was specially limited to ten or twelve Chinese merchants; and these merchants were required, in return for the licenses granted them, to undertake, jointly and severally, the most extensive responsibility to the government, not only for the due payment of all the duties and port-charges to which the foreigners might render themselves liable, but also generally for their orderly behaviour and good conduct. Besides these licensed merchants, a few other persons were permitted to attend upon foreigners in the capacity of *linguists* (interpreters), or *compradores* (victuallers); but with the exception of these persons and the individuals in their immediate employ, the natives in general were withheld, by the denunciation of very severe penalties, from either frequenting the houses of foreigners or holding any species of intercourse with them.

Such are the restrictions and disabilities originally imposed upon foreigners and foreign trade in China; in the lapse of years, however, several changes have taken place, and though some of the objectionable regulations are still subsisting in full force, the greater number have been, at different periods, either expressly repealed, suffered to become obsolete, or modified in practice, "in a manner so judicious and beneficial," to use the language of Sir George Staunton, "as to render their ultimate effect upon the trade rather advantageous than otherwise."

ITS EARLY HISTORY.

The Portuguese were the first Europeans who traded direct to China. They visited various ports of the country for some time free from the competition of other nations; and in 1555 they appear to have concentrated themselves at Macao, where they established a settlement. We hear of their ships frequenting the port of Canton in 1578, and trading along the coast of China; but in 1631, in consequence of some disputes which had arisen with the natives, they were restricted to their own settlement at Macao.

Until the year 1637, the English trade with the Chinese was carried on indirectly, at the factories which the East India company had established in other parts of the East. In that year, Courteen's Association, which had recently obtained a patent from the crown, conferring upon them the same privileges as were enjoyed by the East India company, seeking to distinguish themselves by extraordinary enterprise, sent out a large adventure, under the management of Captain Weddell. On the 27th of June, he arrived with several vessels off Macao, and transmitted to the governor a letter from Charles the First. The Portuguese gave him a cold reception, complaining that the native authorities had made them responsible, and imposed a heavy fine on account of his unwelcome appearance. Finding that they were not allowed to communicate with Canton but by shallow straits, and were excluded from the spacious channel of the Bocca Tigris, he determined to trace out the latter passage for himself. He despatched a pinnace with fifty men, which in forty-eight hours reached the mouth of this estuary, and began to ascend. In a few days they were met by twenty junks, with a great mandarin on board, who called them into his presence, and began roughly to expostulate on their thus "searching out the prohibited entrances" into the dominions of so great a monarch. Yet, on their expressing friendly intentions, and an earnest desire to accomplish their object, they were allowed to proceed to the vicinity of Canton. There, however, the hoppo and some other chiefs persuaded them to return to Macao, making lavish promises, none of which were fulfilled; and the Portuguese having amused Weddell till their Japan fleet had sailed, issued an absolute interdict against his trading any longer there. Determined, however, not to be thus baffled, he immediately weighed anchor with his whole fleet for the river of Canton, and anchored in the vicinity of a "desolate castle," the extensive ruins of which, we are informed, may still be seen immediately within the entrance of the Bocca Tigris. The Portuguese, meantime, studiously infused into the mandarins the belief, "that the English were rogues, thieves, and beggars." This, according to Mr. Gutzlaff, was no difficult task; such a conviction in regard to every foreigner, being at all times rooted in the mind of the government. Under its impulse, they privily conveyed into the castle forty-six pieces of cannon; and, when their preparations were completed, opened a fire upon one of his barges. Weddell was not a man to submit to such an outrage. He immediately caused his whole fleet to "berth themselves before the castle," and commenced a formidable fire, which the other party returned; but none of their shot "touched so much as hull or rope;" and when they saw the English boats, having on board a hundred men, making for the shore, the fort was speedily evacuated. They forthwith opened a communication, requesting a deputation to be sent to Canton; and when Mounteney and Robinson, two supercargoes, repaired thither, the authorities threw the blame on the Portuguese, granted permission to trade, and even to fortify any position outside of the river. These gentlemen agreed to pay 10,000 reals in duties, and, without further negotiation, began to load their vessels. The storming of the castle, however, rankled in the mind of the natives, who soon repented of this good treatment. Seven fire-junks were sent down the river, to destroy, if possible, the English fleet; which, however, avoided their attack, but the supercargoes were thrown into prison and almost starved. Mounteney determined to extricate himself, set fire to his apartment, threatening to burn the city; and having thus

made a passage, he rushed into the street, with a sword in one hand, and a purse in the other, to purchase provisions. On learning these treacherous proceedings, Weddell levied open war, laying waste the adjacent towns and villages, attacking and burning several vessels belonging to the imperial fleet. These cogent arguments brought the authorities once more to their senses. The merchants were requested to write to him, desiring that he would forbear any further acts of hostility, and "all would be well." They themselves were set at liberty, and allowed to conclude their transactions, which they did with all despatch, though much thwarted by the Portuguese. Mounteney is said to have entered into an agreement, by which his constituents were to pay annually 2000 taëls, (£666,) in return for free trade and residence. Rumour seems to have represented this voyage as highly profitable, since the company's agent at Masulipatam wrote,—"They have been to China, at a place called Canton, where they made such a voyage, that we conceive never Englishmen were so richly laden as they are with goods, and yet they flow with gold and silver in abundance." There is no mention in the captain's despatch of any such splendid success; nor do the association appear to have taken any steps to follow up the advantage.

The trade continued for some time in a state of depression. In 1664, the trade in tea commenced, that article being imported to the amount of one hundred pounds. On the 13th of February, the directors wrote thus to Madras: "In regard *thea* is grown to be a commodity here, and we have occasion to make presents therein to our great friends at court, we would have you send us yearly five or six canisters of the very best and freshest thea. That which will colour the water in which it is infused most of a greenish complexion, is generally best accepted." The import for general use had, it appears, been chiefly a private concern of the officers; but the market had thereby been so much over-stocked, that "trash thea from Bantam" had been sold for 4d. and 6d. a-pound. The trade was now, therefore, to be carried on altogether by the company themselves. Its progress, however, was severely checked by the imposition, in 1689, of an enormous duty of 5s. a-pound, which rendered it impossible to introduce with advantage any teas except those of the very finest description. In 1693 the staple commodities are said to have been Nan-king silks, damasks, satins, velvets, gold thread, raw-silk, China and lacquered ware, a good quantity of fine tea, some fans and screens. In 1699, there were ordered 300 tubs (chests) of the finer green teas, and eighty of Bohea.

In the month of November in this last-mentioned year, the East India company appointed a president with a council or select committee of four, two factors, and five writers, under whose commercial jurisdiction were placed "the whole empire of China and the adjacent islands." In 1701 Chusan, Amoy, and Canton, were the ports with which the company's trade was carried on; the first was deemed the most desirable, but they were compelled to quit it the following year, though afterwards induced to return. The company soon, however, acknowledged that "they were weary of the trade to Chusan and Amoy;" and they seem at one time to have intended to forsake those ports, and use Banjarmassin, in the island of Borneo, as a depôt. It was found, however, that at Canton the traffic could be conducted on a considerable scale; the factors were, indeed, exposed to many hardships, and had ground for heavy complaints, but the increasing importance of the tea-trade made the company willing to encounter many difficulties.

In 1715 the intercourse with Canton, according to Mr. Auber, had assumed somewhat of the character of a regular trade. At stated seasons ships were despatched from England, each having a supercargo, to conduct the sales and purchases. These vessels proceeded first to Macao, and thence to the Bocca Tigris, where the supercargoes were admitted to an audience with the hoppo, or Chinese commissioner of customs, with whom they stipulated for certain privileges, such as the enjoyment of free trade with all Chinese, without distinction, liberty to hire Chinese servants, to purchase provisions, &c., for their factory and ships, and other similar articles.

In 1720 the formidable confederacy of the cohong first appeared, but only as a combination of private merchants endeavouring to procure a monopoly price for their goods. Our countrymen refused to treat with them, and complained to the viceroy, when the parties were called into his presence and publicly reprimanded. In 1728 the merchants were driven almost to despair, by an addition of ten per cent. on their cargoes, while they were studiously excluded from all appeal to persons in power. Yet, as on recent occasions, when a small party acted with determination, and paid no regard to any prohibition, they found little difficulty in penetrating even to the palace of the Isong-tou, or viceroy. This was twice effected during that disastrous year. On the first occasion they saw his excellency himself, and received some fair promises; but on the second, a chung-ya, or subordinate mandarin, was deputed to receive them. He treated them roughly, upbraiding them with their very unceremonious mode of entry; and, on their threatening to leave Canton unless redress was obtained, said, "they might go if they pleased; other ships would come." He complained much of their troubling him about such a trifling affair. They replied, "that their trade, and the wrongs endured, were no trifles to them;" but he told them "they must apply to the merchants to get them a hearing." They answered very reasonably, "that as the grievances arose from the merchants, how could it be supposed that they would become instruments in any just accusations against themselves; the present case witnessed they would not." To this no reply was made, but the chung-ya finally promised that he would order his people to adjust the disputed points in an equitable manner. He dismissed them with a strict injunction "never to trouble him again on such trifling occasions."

In the year 1736 the emperor, Këën-lung, (who reigned till 1796,) ascended the throne, and the year of his accession was marked by the abolition of an oppressive duty of 4 per cent.,—although the boon was coupled with conditions utterly inadmissible, and which the Chinese were therefore bribed to connive at the neglect of. About this time, also, commenced the security-system, from which the British trade has so severely suffered. A few merchants, called the Hong, were nominated, one of whom was required, on the arrival of every English ship, to become security for the regular payment of the duties; in return for which the representatives of the company were obliged to allow him a corresponding advantage. These persons, burdened by the above obligation, and having also 10,000*l.* to remit in presents to the imperial court, found it necessary to indemnify themselves by an exorbitant price laid on the commodities.

The increasing annoyance to which the English trade at Canton was exposed, led the company to seek to re-open the communication with Amoy. But they found their condition still worse at that port; and were prevented from continuing the attempt, if they had been disposed to do so, by the decree which Këën-lung issued in 1757, strictly limiting the intercourse of Europeans to Canton. This made no change in the actual course of the English trade, which had long centred in that port; yet it acted unfavourably on the interest of the factory. Hitherto, amid all their grievances, the threat of removing to another, and thus depriving the mandarins of the emoluments which they derived from the traffic, had been used with the most beneficial effect. Now, the only menace left to them was, that of quitting China altogether,—a design which neither party could believe to be seriously entertained.

In 1759, two years after Canton had obtained a monopoly of the trade, when the authorities were no longer restrained by the apprehension that foreigners would resort elsewhere, the limitation of our dealings to a few licensed Chinese was made part of the established system of trade, and those individuals, designated Security or Hong merchants, were regularly incorporated under the name of the "Cohong," with whom Europeans were permitted to deal; all transactions with other Chinese, excepting, indeed, petty shopkeepers, being declared illegal.

In 1771, the supercargoes congratulate themselves on having procured the dissolution of this obnoxious cohong, at the cost of 100,000 taëls, (from £30,000 to £35,000,) which they actually expended on the occasion. In 1779-80, however, the same cohong appears again in full operation, and was made the instrument, as it has continued ever since, of levying an additional tax on foreign trade, under the designation of Consoo Fund, the origin of which is thus related. Debts amounting to 3,808,075 Spanish dollars, were owing by Chinese to British subjects, which the latter were unable to recover; and on their representation of the fact to the Madras government, Captain Panton, of his Majesty's ship, Sea-horse, was requested to proceed to China, in order to urge payment, and having instructions from Admiral Sir Edward Vernon, as well as from Sir Edward Hughes, to insist on an audience with the viceroy. This audience, after some delay, and not without the use of threats on the part of the British commander, was obtained,

when Captain Panton received a fair and satisfactory answer to his application.

"This measure," says Captain King, who visited Canton at the period in the Discovery, "had occasioned very serious alarm at Canton. The Chinese merchants who had incurred the debt contrary to the commercial laws of their own country, and denied, in part, the justice of the demand, were afraid that intelligence of this would be carried to Peking; and that the emperor, who has the character of a just and rigid prince, might punish them with the loss of their fortunes, if not of their lives. On the other hand, the select committee, to whom the cause of the claimants was strongly recommended by the presidency of Madras, were extremely apprehensive lest they should embroil themselves with the Chinese government at Canton, and, by that means, bring, perhaps, irreparable mischief on the company's affairs in China. For I was further informed that the mandarins were always ready to take occasion, even on the slightest grounds, to put a stop to their trading; and, that it was often with great difficulty, and never without certain expense, that they could get such restraints taken off. These impositions were daily increasing; and, indeed, I found it a prevailing opinion in all the European factories, that they should soon be reduced either to quit the commerce of that country, or to bear the same indignities to which the Dutch are subjected in Japan."

The result was, that the emperor published an edict, ordering the debts to be paid, but intimating great displeasure at their having been contracted, and prohibiting any such transaction from taking place in future. To guard against it, he directed that no communication should henceforth be held between the British and the merchants, unless through the medium of certain mandarins whom he named. The dealers alleging, doubtless with truth, that these officers would not perform this duty without a consideration, raised the prices of their teas, while they lowered those of the company's imports. The hong monopoly, in spite of every remonstrance, has been ever since maintained; though it has undergone much practical mitigation. These privileged individuals have lent their name to others, called outside merchants, who are thus enabled to traffic with the English. For this accommodation, however, a liberal compensation is, of course, exacted, which must be laid on the price of the goods.

Ever since this period the system of conducting the trade has been through hong merchants. In 1828, in consequence of the prohibition, under severe penalties, of dealings between Europeans and native traders not belonging to the privileged body, some foreigners petitioned the hoppo This functionary gave them a very decisive answer, in the usual style of Chinese courtesy: "The said barbarians," he observed, "a short time ago, repeatedly presented dunning petitions for things contrary to the law, which shows their stupid rashness. From pity to the remote barbarians I did not inflict chastisement, but ordered the merchants to deliberate safely and manage. I likewise ordered them to communicate my orders to the said barbarian merchants, to obey the fixed regulations in their trade. If the said shopmen dare to stir up the barbarian merchants to confused petitioning, or if they presume to trade with the barbarians, the moment they are discovered and caught, their crime shall positively be punished with severity. Their perverseness and stupidity have reached the acmé."

OCCUPATION OF MACAO BY THE BRITISH.

In the year 1808, when Buonaparte had developed his designs for securing the kingdoms of Spain and Portugal, an English force was landed at Macao, in order to occupy that settlement, and prevent its seizure by the French. This event, as Mr. Auber remarks, is deserving of particular attention, as it not only shows that we have recocognised the right of the Portuguese to the settlement of Macao, but marks the jealousy with which the Chinese view any approach to their territories by a foreign force, although with no hostile intention towards their nation, and evinces their determination to have withstood, however ineffectually, the extreme measures to which Admiral Drury, (then in command of the naval force in India,) manifested his intention to resort, in the prosecution of the service in which he was engaged.

It was in the month of March 1808 that the select committee of supercargoes at Canton communicated to the Bengal government, a vague report which had reached them, of the intention of the French with regard to the settlement of Macao. It was suggested that Macao ought to be placed in a better state of defence, and an opinion was offered, that no apprehension need be entertained of embarrassment from the Chinese government, if permission were obtained from the Portuguese for that purpose, although in fact, as it afterwards appeared, the Portuguese were under a pledge to the Chinese government, not to admit the troops of any nation into Macao without their previous consent. The Bengal government, however, upon the receipt of this information, resolved that a military force should be sent to occupy Macao; but the commanding officer was directed not to take any steps without the knowledge and concurrence of the select committee, who were cautioned to bear in mind the orders issued by Lord Wellesley in 1801, for guarding against the effect of jealousy on the part of the Chinese government.

About the middle of September, Admiral Drury, who commanded the naval part of the expedition, learnt that a considerable French force was off Java, and suggested the expediency of applying to the Chinese authorities for leave to land the troops at Macao. To this the select committee objected; and on the 18th of September they resolved, in opposition to the declared sentiments of the governor of Macao, and to the known feelings of the Chinese, to land the troops at once. When the landing took place, a letter was received from the hoppo, or chief officer of customs, protesting decidedly against the step. The admiral wrote to the viceroy, explaining the motives which had led to it; the reply of the viceroy contained a strong remonstrance against the adoption of such a measure without permission, and a threat of representing the whole affair to the emperor. The Chinese local authorities issued an order for the withdrawal of the troops, and declared that they would entreat the emperor to interdict in future the commerce of our ships. The Chinese troops, too, were ordered down to compel our troops to evacuate the town; and an intimation was given that in the event of non-compliance, they would burn the ships at Whampoa, secure the English, and put to death or otherwise punish them. A second division of troops was landed in October; and the select committee asserted "the impossibility of giving way to the Chinese so long as they persevered in their haughty conduct." They afterwards sent a letter to the viceroy, requesting that a person might be appointed to receive their representation upon the whole question; and, in reply, were informed that the viceroy had seen the letter, but did not think a compliance necessary, "as the troops must be removed, their remaining on shore being contrary to the law of the empire." In a subsequent conference with two of the Chinese merchants, the committee stated, that during the haughty conduct of the viceroy, the admiral could not remove any troops, "as it might have the appearance of fear."

The admiral then demanded an audience of the viceroy, who did not return any answer. Addresses were subsequently sent to him, but he remained firm in declaring the absolute necessity of removing the troops. The admiral declined advancing any further, "as the sword was half out of the scabbard, and his duty forbade him making war with China." At length the president of the select committee intimated his intention of ordering all British subjects to quit Canton in eight-and-forty hours; and declared it to be his opinion that the best effects would follow if his majesty's ships were brought to an anchorage higher up the river. Two days afterwards the president received a communication, in which the viceroy stated, that his (the viceroy's) conduct had been marked by the greatest forbearance; that he should not commence hostilities, though if we ventured to make war with China he was quite prepared for it; and that if the committee thought proper to remove the ships, he had no objection, only they must not expect to be permitted to return. At the same time, troops were brought, and encamped on the neighbouring hills; and it was threatened that fire-vessels should be sent down amongst the company's shipping. On the 4th of December the select committee assembled at Macao, to receive the emperor's edict for withdrawing the troops b fore the continuance of the trade could be permitted. "Knowing, as you ought to know," said this boasting document, "that the Portuguese inhabit a territory belonging to the celestial empire, how could you suppose that the French should ever venture to molest them? If they dared, our warlike tribes should attack, defeat, and chase them from the face of the country. Aware of this truth why did you bring your soldiers here? Repent and withdraw immediately; permission to trade shall then be restored. But should you persist and remain, the hatches of your ships shall not be opened."

A chop was addressed by the viceroy to the admiral, with the emperor's decree. A similar document was also addressed by him to the senior commander, captains, officers, petty-officers, and others belonging to the English ships at the port of Whampoa, and "delivered to the said senior commander, Captain Milliken Craig, of the Elphinstone, by the mandarins deputed by the Tsung-tuh, under a canopy of state, surrounded by Chinese guards, under arms, erected for the occasion on French Island, on the side of a hill, having a Chinese camp on each side on hills, each about one mile distant, and all in view from the van ships of the Hon. Company's fleet, moored in line of battle within gunshot." This curious document is worthy of perusal.

"I, the mandarin Vu, by favour of my prince Tsung-tuh of the two provinces of Kwang-tung and Kwang-se, member of the Tribunal of War, &c., direct this letter to the captains, officers, passengers, and others, belonging to the English ships, to warn you, that being certain that your bad kingdom is situated on an island of the sea, and that you originally employed yourselves in making watches, to enable you to pay your taxes; afterwards, by the especial and profound goodness of our great emperor, who was desirous of benefiting you, he granted you permission to come to this empire to trade. Behold, what exalted and profound virtues belong to him!!! Notwithstanding this, the admiral of your kingdom, regardless of the laws, has brought here, for the first time, foreign soldiers, and, without leave, introduced them into Macao, and your chief supercargo uniting with him, they are with one accord making disturbances. This being the case, I informed the emperor, from whom I have just received a decree, in virtue of which I again send mandarins deputed to inform them that if they persist in detaining the soldiers, a great many troops shall be immediately despatched to destroy and extinguish them, and to terminate this business; for the consequences of which, the admiral and chief supercargo will be responsible; but you, captains, officers, passengers, and others, people of the ships, shall be free from all responsibility, if you remain quietly in the observance of the laws; and, after the soldiers of your nation shall be entirely withdrawn, I shall feel it my duty to inform the emperor, praying him to have the goodness to permit you to carry on your trade as formerly. But if you, giving ear to and obeying the admiral and chief supercargo, unite yourselves to them to create disturbances, when afterwards our innumerable soldiers shall arrive, who shall destroy and burn you, even if you were as hard as stone or jasper, I shall then not be able to use you with any indulgence, nor free you from the net of the law in which you will be ensnared; and in order that you may be obedient and discreet, I direct this chop to you. In the 13th year of the emperor Kia-king, on the 17th day of this 10th moon." (3rd December, 1808.)

The commanders of the company's ships at Whampoa, in their reply stated, that they had the exalted honour to acknowledge the receipt of his excellency's most gracious letter, delivered to them on French Island, by the two mandarins, whom, they were informed, it had been his condescending pleasure to send to them—that their only object in visiting China was commerce—that they endeavoured to venerate and obey its laws, but durst not, however, depart from allegiance to their own country, or to those who were dignified with its most exalted representation—that they understood that their admiral, at the request of the Portuguese, had landed some troops at Macao, to help them to defend it against attacks from the French—that that wicked nation, ever since they murdered their sovereign, had waged war upon all nations within their reach, and were understood to be then marching by land to make war upon the celestial empire, as the British navy prevented them by sea—and that they therefore most humbly implored his excellency to order the trade to be opened, that they might thereby find employment in the quiet habits of industry, &c. The viceroy, in his answer told them that, seeing they did not think proper to alter their way of thinking, he plainly knew that they had joined their opinions with those of their superiors, the admiral and president,—that if they did not wish to trade they might take away their ships as they thought proper, and if they did they must remain peaceable and obey the laws.

In the meanwhile the president, instead of relaxing, had begun to be more active in his preparations for defence; the batteries of the Bocca Tigris had fired upon the ships going up and down, and obliged one of them to return the fire, and on the 6th of December another camp had been observed to be formed upon the heights of French Island. It was upon the following day that the viceroy sent his answer to the commanders of the company's fleet; and on that day also he wrote to the admiral that he would cause all debts to be paid, stating for the last time "that while there remained a single soldier in Macao and the laws disobeyed, they should not trade," and if he hesitated for a moment, "innumerable troops would be sent to destroy him." On the 8th the president gave way, the admiral remonstrating against holding out any longer; a convention was concluded on the 10th, and the troops were embarked on the 15th.

"Thus," says Mr. Auber, the late secretary of the East India company, "after fruitless discussion for weeks, and the adoption of every measure short of hostilities to support the original plan of occupying Macao, the Chinese adhered to the demand with which they set out, namely, *the withdrawal of the troops*, to which the committee were obliged to submit before the trade was permitted to be resumed. Thus affording another decided proof of the inflexibility with which the Chinese insist on the observance of their laws and regulations."

Other writers view the matter in a different light, and think we did not succeed because we did not go far enough. Mr. Gutzlaff thinks that the British national honour was stained for ever; and says that a pyramid, recording the victory of Chinese cowardice over British imprudence is erected near the spot whence the admiral retreated. "He withdrew with his garrison from Macao; the English nation was viewed with greater contempt; it was written down in the Chinese annals, 'We have beaten the English;' The undaunted veterans of the Nile and Trafalgar had retreated." Mr. Mc Leod remarks upon this event, that after the retreat of Admiral Drury, there was no end to the gasconading of the Chinese. "They considered his retiring as a great victory gained, and it is celebrated as such by an inscription in one of their pagodas:—an inscription, by the way, which ought to come down."

DISPUTES OF 1829 AND 1830.

THE years 1829 and 1830 were marked by a series of vexatious discussions, excited apparently, less by Chinese encroachment, than by a strong desire entertained by the committee to liberate themselves from certain annoyances to which they had long been exposed. The entry-duty, of 2780 dollars, on every vessel, which had not fallen heavy on the large ships from Europe, was almost prohibitory on the small craft which carried on the traffic with India. The refusal of permission to the English to bring their wives and families to Canton, and to use sedan-chairs, the only commodious vehicle which could be procured, was resented as a grievance. The exactions, too, levied from the hong-merchants, by which several of them had been reduced to bankruptcy, greatly embarrassed the trade. The committee seem to have been chiefly encouraged to assume a high tone by recent observations on the radical weakness of the native government, and the facility with which they yielded to displays of superior power. By a repetition of these it was conceived that they might be overawed into granting any reasonable demand. Application was made for a naval force from Bengal; but the governor-general declined interfering, and referred them to the directors at home. They had at one time formed, and even announced their resolution, to stop the trade and leave China; but this design was not carried into execution. The natives acceded to the wishes of the English, so far as to create new hong-merchants in the room of those who had become insolvent. But every other demand was repelled with their usual determination, and even with contumely. In their replies and proclamations, the following expressions occur:—"Since the said foreigners come to trade, it is incumbent on them to obey implicitly the orders of government. If they dislike the restrictions, it is perfectly competent of them not to take the trouble to come from so great a distance. The contemptuous resistance of the foreigners arises from no other than a special design to coerce us by the circumstance of their paying much duty. The celestial empire views these duties as really not of the importance of a fibre or particle of dust. How can the chief Baynes (the president of the select committee) resist the prohibition and orders, and bring with him a barbarian woman (Mrs. Baynes) to Canton! If she will remove early to Macao, he will avoid a severe scrutiny. As to sitting in sedan-chairs, it is in itself a small business; but foreigners being in the provincial city, have hitherto not been allowed to ascend sedan-chairs. The said foreigners, ignorant how to be excited to

gratitude, turn round, and because of the proclamation disallowing them to bring barbarian women to Canton, and to sit in sedan-chairs, present whining petitions. The flowery nation and the barbarians must be distinctly divided; between those inside and outside there must be erected a great boundary. It is incumbent on the said chief and others to take the authoritative decisions which have been issued, and promulgate them for information. Why do they again, and a third time, obstinately refuse to transmit those injunctions, and dun us with requests to give a written document in return? Exceedingly does it indicate refractory stupidity. Hereafter it will be absolutely necessary to yield implicit obedience to the laws and regulations of the celestial empire, and adhere strictly to old arrangement. If, again, any dare to oppose or transgress, and again create disturbance, then, assuredly, in immediate adherence to the imperial will, a severe scrutiny will be made, and punishment inflicted. Decidedly, there will not be the least clemency or forbearance shown. Tremble at this! Intensely are these commands given!"

The court of directors, on these transactions being reported to them, disapproved so entirely of the conduct and views of their agents, that they came to the unanimous resolution of appointing a new committee. They decidedly abjured every intention of coercing the Chinese by threatening measures. In a subsequent despatch in 1832, they say, "The commerce between Great Britain and China is too important to be put to hazard without the most urgent and imperious necessity, and on no account upon considerations of a personal nature. It is a notion so commonly entertained and acted on by you, and encouraged by foreign merchants residing at Canton, that nothing is to be gained from the Chinese by obedience to their laws and edicts, but that much may be obtained by intimidation. You may have succeeded for the moment in setting the government at defiance; but that government has not only taken the first opportunity to assert its dominion, but also, with the view of making you feel the consequences of disobedience, it has almost invariably deprived you of some advantages which it had either tacitly or avowedly yielded to friendly remonstrances."

OPENING OF THE BRITISH CHINA TRADE.

In the year 1833 an act was passed providing that the exclusive trade to China enjoyed by the East India Company should cease, from April 22, 1834, the company, indeed, being obliged to close all their commercial transactions from that day. In the same year another act was passed, regulating the manner in which the open trade, thus permitted, should be carried on; and this act provided for the appointment of a superintendent of the China trade; to whom, residing in China, were granted the powers deemed necessary for the purposes of commerce. The first person appointed to this office was the late Lord Napier, a captain in the navy; who received instructions to repair to Canton, for the purpose of discharging its duties. On the 14th of July, 1834, his lordship arrived, in the Andromache, at Macao; and soon after sailed for Canton, which he reached on the 25th.

In a former year, the viceroy of Canton, in an edict issued with reference to the approaching change in the trade, had said, "I hereby issue an order to the said hong-merchants, that they may forthwith enjoin my command on the said nation's chief, early to send a letter home, that if, indeed, after the thirteenth year of Taou-Kwang, the company be dissolved, it will, as heretofore, be incumbent to deliberate, and appoint a chief who understands the business, to come to Canton, for the general management of the commercial dealings; by which means affairs may be prevented from going to confusion, and benefits remain to commerce."

Before Lord Napier's arrival at Canton, all his movements had been closely watched by the Chinese government. A report was made that an English vessel of war, having on board a *barbarian eye*, (officer of rank,) had anchored at Cabreta Point, near Macao. Hereupon Loo, the governor of Canton, having understood that the English company was dissolved, and judging that this new officer was to supply the place of their tae-pan, or supercargo, issued an order that the hong-merchants should proceed to Macao, and ascertain what were the circumstances under which the trade was now to be conducted, and the regulations that would thence become necessary. Notice was given at the same time, that until a full report was made to the governor, and his consent obtained, the superintendent, though he might reside at Macao, was by no means to present himself at Canton. In pursuance of this order, Hou-qua and Mouqua, deputed by the hong, proceeded to Macao, but before they could reach that place, Lord Napier had set out; and, notwithstanding all their efforts to overtake him, he arrived at Canton before them. Next day, a letter from him to the viceroy was presented at the city-gates, but was rejected on account of its not being in the form of a petition. The displeasure of the government was immediately manifested by the disappearance of all the native servants in the employ of the British.

A strong sensation was now created in the city, and a report was made to the hoppo, that, on the 18th of the present moon, about midnight, "a barbarian ship's boat had arrived at Canton, bringing four English devils," who took up their abode in the factory. This being connected with the appearance of a British man-of-war in the outer seas, was represented as a clandestine stealing into Canton. The governor issued an order, declaring the impossibility, that in conformity to the laws of China, this new eye or officer could continue in that city:—"Even England has its laws; how much more the celestial empire! How flaming bright are its great laws and ordinances, more terrible than the awful thunderbolt! Under this whole bright heaven, none dares to disobey them. Under its shelter are the four seas. Subject to its soothing care are the ten thousand kingdoms." Actuated, however, by feelings of clemency, and allowing for the ignorance of national laws and customs incident to a stranger, he ordains, that if the latter, after having despatched the business on which he came, shall immediately return to Macao, and promise never to resort to Canton without special permission, the past offence will be overlooked.

The hong merchants tried all the means in their power to induce Lord Napier to give way; but his lordship having been refused access to the imperial officers, declined to communicate with the merchants. The latter, frustrated in all their endeavours, resolved to secure the good-will of their own government by proposing a suspension of the trade. By taking this course they obviated the suspicion of collusion, which probably induced the government to lay upon them so heavy a load of responsibility. In an elaborate mandate, issued by Governor Loo, their conduct is declared to be most highly praiseworthy, "manifesting a profound knowledge of the great principles of dignity." Yet he does not proceed immediately to take the strong step recommended. He pretends, indeed, that the trade and the duties arising from it, "do not concern the celestial empire, to the extent of a hair or a feather's down." But knowing the divine wish of his great master to cherish both those within and those without, he was unwilling to involve thousands of the latter in ruin for the disobedience and obstinacy of one individual. He therefore allowed a short interval, that the barbarian eye, said to be "a man of very solid and expansive mind, and placid speech," might have an opportunity to reconsider his rash decision.

At length, on the 2nd of September, the long-threatened order for the entire suspension of the trade was issued. Its effects were immediately apparent. Fresh provisions could no longer be procured, and Lord Napier and his suite were obliged to live on salt meat conveyed from the ships of war. Matters being thus brought to extremities, the resolution was taken to order up his Majesty's ships, Andromache and Imogene, which were anchored without the Bogue. The ships began to move on the 7th, and the forts defending the entrance of the river fired upon them. A contest ensued for an hour and three quarters, the time occupied in the winding passage of the channel, and the ships then anchored, in consequence of the state of the wind, until the 9th. On that day they proceeded on their way, and a contest again ensued with the forts on the shore, which, of course, were unable to prevent the passage of the vessels, though they occasioned the death of one man in each.

On the 11th another order was issued, in which the former demands of the Chinese government were repeated, and the conduct of Lord Napier severely stigmatized. Yet it was still intimated to him that, if he would repent of his errors and even then obey the laws of the empire, indulgence would be extended to him. It is unnecessary for us to detail the occurrences of the few days following, which rendered Lord Napier's position a very difficult one. His difficulties now were increased by severe indisposition, caused by toil and anxiety. Under these circumstances, he shrunk from the calamities which would ensue from the

TRIUMPHAL ARCH, AT CANTON.

continued suspension of intercourse; and on the 14th he announced his determination to yield, and to quit Canton. The ships of war, also, on the demand of the native government, were ordered to move out to Lintin. It was at first intended to bring up a British cutter for his lordship; but, by arrangements afterwards made with the hong merchants, two chop-boats were provided, in which he embarked on the evening of the 21st. Although there had been a full understanding that he should be conveyed in a commodious manner, suited to his dignity and with the utmost possible despatch, it was soon discovered that they were under the convoy of several armed boats, which proceeded so very slowly that they anchored for the night still in sight of the town. They reached Heang-shan on the 23rd, at midnight, but were there detained for nearly two days, amid a tremendous beating of gongs, noise, and confusion, which severely aggravated his illness. It was not till after the most urgent representations, that Mr. Colledge, the surgeon, obtained a pass to proceed; nor did they reach Macao till the 28th. His lordship's weakness, however, which, at his departure was so great, that he required to be assisted into the boat, had increased so much, that the attentions of his family and medical attendants were of no avail, and he expired on the 11th of October. The functions of superintendent then devolved on Mr. Davis.

The Chinese authorities, according to custom, transmitted to court a boastful account of this transaction; representing Lord Napier as having been admitted to mercy only after the most humble submission, and then ignominiously driven out of Canton. As it had, however, been previously necessary to intimate the fact of the ships having forced their way up the river in defiance of the forts, that proud government, unwilling to own its weakness, threw the whole blame on the officers employed. In the "vermillion-coloured reply," it was said, "it seems that all the forts are erected in vain; they cannot beat back two barbarian ships; it is ridiculous, detestable. The military preparations being reduced to such a state as this, it is not surprising that the outside barbarians regard them slightingly." By a mandate from the tribunal of war, the naval officer immediately in command, was degraded, and condemned to wear the cangue, or wooden pillory, in public at the maritime entrance. All the officers on duty at the forts were to carry the same disgraceful badge; he, the naval commander-in-chief, had, by gross negligence, shown himself wholly unworthy of employment, and was therefore deprived of it. Even Governor Loo must have his two-eyed peacock's feather plucked out and lose some of his titles; but, as he had announced certain active measures as now in operation for expelling the barbarians, he was allowed to retain the command, with injunctions, to carry his plan into effect.

The departure of Lord Napier was immediately followed by the re-opening of the trade, which took place on the 27th of December following. Speaking of Lord Napier, Mr. Reynolds, the historian of the *Voyage of the United States' Frigate, Potomac*, says, that his name will be remembered as that of a benefactor to the commercial world. "The English," continues this American writer, "have made a good beginning by battering down the Chinese forts on the river Canton; we hope they will follow it up, and with increased force teach the Chinese a still more impressive lesson of 'barbarian justice and prowess.' A certain amount of fighting is necessary, and the sooner it is done the better." To this sentence there is a note appended, rather curious for its amusing candour. "The English," says Mr. Reynolds, "who have so often fought the battles of their continental neighbours, will most probably perform this service, from which we shall be equally benefited; and should they now, as formerly, be content with the glory they may acquire for their pay, we cannot object, provided we increase our trade, and increase it we will."

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Whitehaven, Gibson.
Wigton, Ismay.
Winchester, Jacob & Co.
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THE EUPHRATES EXPEDITION.—BABYLON.

THE PRESENT TOWN OF HILLAH, ON THE RUINS OF BABYLON

THE Euphrates Expedition, undertaken for the purpose of ascertaining the navigability of that river, must be considered one of the most useful and interesting journeys recently made. Useful, not only because of proving practicable a much shorter and more convenient route from hence to India; but also as opening out new sources of commercial enterprise with a people with whom we have as yet had little intercourse; and whom, it appears, Europeans have hitherto much misunderstood.

But the usefulness resulting from such an expedition even yields to the interest it must awaken in the mind of the Biblical or classical antiquarian. The river Euphrates, whose banks have been styled "the cradle of the world," whose margins bore the proud weight of the greatest cities of antiquity; and whose bosom was ploughed by the ships of the princely merchants of Babylon, concerning which so many prophecies of Holy Writ were recorded and terribly fulfilled,—the theatre of war of the Ten Thousand Greeks and the army of Alexander,—the early seat of Christianity,—offers a mine of material for the poet, the philosopher, and the historian.

Having been kindly granted access to the Notes of the accomplished Surgeon and Naturalist of the Expedition, Mr. Ainsworth*, (to whom we are also indebted for the sketch, taken on the spot by Lieutenant Fitzjames, R.N., from which our engraving is made,) we are enabled to lay before our readers some curious and novel facts concerning the "city of cities," Babylon the Great.

The modern town of Hillah is situated upon the river Euphrates, where once stood a considerable suburb of Babylon. Its present population, which may average from six to seven thousand souls, consists chiefly of Arabs, who have their own Sheik, but the Mutsellim, or governor of the place, is under the pacha of Baghdad, and resides in a fortress within the town. There are bazaars and markets on both sides of the river. The shopkeepers are chiefly Armenians, Turks, and Jews. A most important fact connected with these traders is, that Manchester and Glasgow goods that were taken out by the Expedition as samples, were eagerly bought by them, at a profit

* Mr. Ainsworth's work, *Researches in Babylonia, Assyria, and Chaldæa*, is now published, and the Author has departed on a journey to the Syrian Christians, under the auspices of the Society for Promoting Christian Knowledge, and the Royal Geographical Society of London.

to the sellers of 100 per cent*. There is much trade carried on in the town both by camels from the interior, and by boats laden with rice, dates, tobacco, and other articles most in demand among the desert tribes.

In connexion with this town, and the immense extent and magnificence usually ascribed to the city of Babylon, Mr. Ainsworth makes the following observations:—

The great question which has occupied historians in connexion with Babylon is, whether the account given of its size and magnificence by the ancient profane writers, in some cases supposed to have been eye-witnesses of its glory and splendour, are not exaggerated. There has been the customary abuse of the standard of measurement amongst classical authors, and the same difficulty of reconciliation left to the moderns †.

But in this question, a great elementary principle has been hitherto entirely lost sight of. The cities of the earliest races of mankind were not, as in modern times, vast and crowded congregations of houses, built side by side in compact and extensive masses, but each dwelling had its garden, pasture, and tillage-lands surrounding it, the whole being enclosed by a wall. This fact at once reduces the wonder often evinced at the vast space occupied by many ancient cities of the East. In the centre of the vast enclosure, or in some conspicuous part, were the residences of the authorities, the chief of whom was already called king; here also was the temple of their god, or the house of their captives, as at Babylon. There are abundant evidences that this was the fact in the two great cities of antiquity,—Babylon and Nineveh; of the former it is stated by Curtius, that the intervals which separated the houses were sown and cultivated, to provide subsistence in case of siege.

A consideration of these circumstances does not, therefore, allow of any comparison between the population of a city of Assyria or Babylonia with the population of a modern city of equal extent. This is an element in all the pompous records of the past grandeur of Babel, which must not be lost sight of. And even in reference to its boasted magnificence, the poetical character of Eastern writings, and the remote periods to which they refer, must not be forgotten in the overwhelming interest of the subject. "The greatest cities of Europe," it has been said, "give but a faint idea of the grandeur which all historians unanimously ascribe to the famous city of Babylon;" and this opinion has been echoed by every lover of hoary antiquity. Then came the fulfilment of its predicted destruction, and the glory of God appears to be enhanced in the eyes of man, by the magnitude of the object against which his anger was directed; but a knowledge of the real state and circumstances of the great Eastern mart of iniquity, would probably show that mercy predominated over punishment.

Some modern authorities have thought that they could trace on the plains of Hillah the extent of ancient Babylon; but their data are frequently few, and in reality deceptive. The lines drawn on maps are often only used to divide distant mounds of ruin. Accumulations of pottery and brickwork are met with occasionally over a great tract, but the connexion supposed between these and the corn-fields and gardens, within the common precincts of a wall, is gratuitous in the extreme. Imagine London and Paris to be levelled, and the inhabitant of some future city to visit their ruins, as those of then remote antiquity; if in the one instance Sèvres, Mont Rouge, and Vincennes, or in the other Greenwich, Stratford-le-Bow, Tottenham, Highgate, Hammersmith, Richmond, and Clapham, be taken in as boundaries, or identified respectively as the ruins of Paris and London; what a prodigious extent would those cities gain in the eyes of futurity!

Like other great cities in the East, the great Babel was, in the lapse of time, known by different names, and, ultimately, subdivided into various parts.

The first quarter of Babylon that appears to have been separated from the mother-city, if indeed it was not originally distinct, was that on the west side of the river, and contains the Birs Nimrood. The word "Birs," as applied to this mound or ruin, cannot be satisfactorily explained in Arabic, as a derivative of that language; and it would appear, that all attempts to deduce it from the Hebrew or Chaldaic tongues have failed, as they are founded on a change of the radical letters.

It was from Birs, or Bursif, that the produce of the Birsean looms—the cloth of Birs—derived its name. The almost only remnant of Borsippa, probably the temple of a national worship performed in high places, one of which belonged to each Babylonian city, and to each quarter of Babylon itself, still preserves its ancient name. Birs Nimrood has been generally looked upon as the remnant of the great pile of Babel, but it will appear much more probable to have belonged to the city of Birs, Bursif, or Borsippa, and one of the quarters of the Babylon of Herodotus.

Marudi, in his *Universal History*, mentions Babil, the capital of Aferadun, and one of the "climates" of the earth, so named from the name proper to one of its towns. This town is situated on both banks of the canal, derived from the Frat in the province of Irak, one hour's journey from the city called Jisr Babil and the canal of Al Birs.

The quarter of Babel itself appears to have changed its name, and to have received that of Nil. The mounds of Babel and the Mujaleba are nearly surrounded by two canals which bear that name in the present day. Abulfeda described the main stream of the Frat as flowing to the city of Nil, and giving off the canal of Nil, after which it is called the Nahr Sirat. D'Anville also notices a town called Nilus, without having a definite idea of its position.

The square superficies of the mound of Babel is 49,000 feet; its elevation at the south-east corner, 64 feet. To the south of it is the Mujaleba, having a square superficies of 120,000 feet, and a height of only 28; beyond this again, the Amram ebn Ali, having an area of 104,000 feet, and an elevation of 23 feet. The Mujaleba has been read as if it were Makalbid, from Kalba, "the overturned, or overthrown," whereas a much nearer affinity exists to Mujaleba, plural of Jalib, the "home of the captives," and not improbably the residence of the Israelites who remained in Babylon. This version is favoured by the name of Heroot and Maroot also given to the mound by the natives, from a tradition that near the foot of

* It would be curious if, in the progress of commerce and civilization, the neighbourhood of Babylon should again become the scene of princely mercantile traffic; it is described in the Revelations as having once been (xviii. 12, 13), "The merchandise of gold, and silver, and precious stones, and of pearls, and fine linen, and purple, and silk, and scarlet, and all thyine wood, and all manner of vessels of ivory, and all manner of vessels of most precious wood, and of brass, and iron, and marble, and cinnamon, and odours, and ointments, and frankincense, and wine, and oil, and fine flour, and wheat, and beasts, and sheep, and horses, and chariots, &c."

† Herodotus gives the extent of the walls of Babylon at 120 stades on each side, or 480 stades in circumference; Diodorus 360 stades in circumference; Clitarchus, who accompanied Alexander, 365; Curtius states it at 368; and Strabo at 385 stades. The general approximation of these measurements would lead us to suppose that the same stade was used by the different reporters, and if this was the Greek Itinerary stade, we may estimate the circumference of the great city at twenty-five British miles

the ruin there is an invisible pit, where D'Herbelot relates that the rebellious people were hung with their heels upward, "until the day of judgment." The Kasr, or palace, is a mound of about 700 yards in length and breadth. Its moulded bricks, ornamented with inscriptions, and its glazed and coloured tiles, added to the sculptures that have been found there, speak of its importance, and have led to its being generally looked upon as the eastern and the largest of the palaces of the Babylonian monarch, renowned for its sloping gardens.

Between the Kasr and the Amram there is every probability the Euphrates once flowed, where the subaquatic tunnel of Semiramis may have existed, and where quays lined the banks at the time Alexander was carried over during his last illness.

The Amram ebn Ali (so called from a son of Ali,) has been more generally, and with probably a greater degree of plausibility, identified with the western palace. It is surrounded by ridges or mounds of ramparts which were the defence of this large space, and of all the establishments it contained.

The fourth quarter of Babel is marked in its central space by the mound of Al Heimar or Hámir, an isolated eminence once having a superficies of 16,000 feet, and an elevation of 44 feet, with a ruin on the summit eight feet high. Its modern name is derivable from the Arabic root *hamará*, "to be, or become red," denoting the red mass or ruin on the summit: Alhambra, one of the four wards of Grenada, was also so called from the red colour of the materials of its buildings.

REMAINS OF THE KASR, OR PALACE, IN THE RUINS OF BABYLON.

WHAT different ideas are formed in different nations concerning the beauty of the human shape and countenance! A fair complexion is a shocking deformity on the coast of Guinea; thick lips and a flat nose are a beauty. In some nations, long ears that hang down upon the shoulders, are the objects of universal admiration. In China, if a lady's foot is so large as to be fit to walk upon, she is regarded as a monster of ugliness. Some of the savage nations in North America tie four boards round the heads of their children, and thus squeeze them, while the bones are tender and gristly, into a form that is almost perfectly square. Europeans are astonished at the absurd barbarity of this practice, to which some missionaries have imputed the singular stupidity of those nations among whom it prevails; but when they condemn those savages, they do not reflect that the ladies in England had, till within these very few years, been endeavouring, for near a century past, to squeeze the beautiful roundness of their natural shapes into a square form of the same kind.—SMITH.

MANKIND have a great aversion to intellectual labour, but even supposing knowledge to be easily attainable, more people would be content to be ignorant than would take even a little trouble to acquire it.—JOHNSON.

DEPENDANCE OF MAN UPON HIS CREATOR.

FOR the continuance of life a thousand provisions are made. If the vital actions of a man's frame were directed by his will, they are necessarily so minute and complicated, that they would immediately fall into confusion. He cannot draw a breath without the exercise of sensibilities as well ordered as those of the eye or ear. A tracery of nervous cords unites many organs in sympathy, of which, if one filament were broken, pain, and spasm, and suffocation, would ensue. The action of his heart, and the circulation of his blood, and all the vital functions, are governed through means and by laws which are not dependant on his will, and to which the powers of his mind are altogether inadequate. For, had they been under the influence of his will, a doubt, a moment's pause of irresolution, a forgetfulness of a single action at its appointed time, would have terminated his existence

Now when man sees that his vital operations could not be directed by reason, that they are constant, and far too important to be exposed to all the changes incident to his mind, and that they are given up to the direction of other sources of motion than the will, he acquires a full sense of his dependance. If man be fretful and wayward, and subject to inordinate passion, we perceive the benevolent design in withdrawing the vital motions from the influence of such capricious sources of action, so that they may neither be disturbed like his moral actions, nor lost in a moment of despair.

When man thus perceives that in respect to all these vital operations he is more helpless than the infant, and that his boasted reason can neither give them order nor protection, is not his insensibility to the Giver of these secret endowments worse than ingratitude? In a rational creature, ignorance of his condition becomes a species of ingratitude: it dulls his sense of benefits, and hardens him into a temper of mind with which it is impossible to reason, and from which no improvement can be expected.—BELL.

WHAT IS HOME?

THAT is not home, where day by day
I wear the busy hours away;
That is not home, where lonely night
Prepares me for the toils of light;
'Tis hope, and joy, and memory, give
A home in which the heart can live:
These walls no lingering hopes endear,
No fond remembrance chains me here.
Cheerless I heave the lonely sigh—
Eliza, canst thou tell me why?
'Tis where thou art, is home to me,
And home without thee cannot be.

There are who strangely love to roam,
And find in wildest haunts their home;
And some in halls of lordly state,
Who yet are homeless, desolate.
The sailor's home is on the main,
The warrior's, on the tented plain,
The maiden's, in her bower of rest,
The infant's, on his mother's breast;
But where thou art, is home to me,
And home without thee cannot be.

There is no home in halls of pride,
They are too high, and cold, and wide.
No home is by the wanderer found;
'Tis not in place: it hath no bound,
It is a circling atmosphere
Investing all the heart holds dear;
A law of strange attractive force,
That holds the feelings in their course.

It is a presence undefined,
O'er-shadowing the conscious mind,
Where love and duty sweetly blend
To consecrate the name of friend;
Where'er thou art, is home to me,
And home without thee cannot be.—CONDER.

THOUGH we seem grieved at the shortness of life in general, we are wishing every period of it at an end. The minor longs to be of age, then to be a man of business, then to make up an estate, then to arrive at honours, then to retire.—*Spectator*

CHAPTERS ON CORONATIONS.

No. III.

THE REGALIA, 2.

THERE is some reason to believe that King Alfred's crown was preserved in England until the time of the Commonwealth, for in the inventory of "that part of the Regalia which are now removed from Westminster to the Tower Jewel House," we find the following entry: "King Alfred's crowne, of gould wyerworke, sett with slight stones, and two little bells, p. oz. 79½, at 3*l.* per ounce, 248*l.* 10*s.* 0*d.*" The purpose of such strange appendages as the bells is a matter not very easy to discover, and the conclusion of the inventory puts an end to all conjecture, for, after enumerating the various antique regalia, and reciting their value, we find the Vandal record: "All these, according to order of parliament, are broken and defaced."

The other crowns destroyed at this time are thus enumerated in the inventory:—

The imperiall crowne of massy gold, weighing 7lb. 6oz., valued at 1,110*l.* 0*s.* 0*d.*

The queen's crowne of massy gold, weighing 3lb. 10oz., valued at 338*l.* 3*s.* 4*d.*

A small crowne found in an iron chest, formerly in the Lord Cottington's charge, [it was the crown of Edward the Sixth,] of the which the gold, 73*l.* 16*s.* 8*d.*

And the diamonds, rubies, &c., 355*l.* 0*s.* 0*d.*

Queen Edith's crowne, formerly thought to be of massy gould, but upon triall found to be of silver gilt, enriched with garnetts, foule pearle, saphires, and some odd stones, p. oz. 50½, valued at 16*l.* 0*s.* 0*d.*

KING'S SCEPTRE, WITH CROSS.

The SCEPTRE ROYAL, which the sovereign bears in the right hand, is made of gold, and is two feet nine inches in length: it is richly adorned with precious stones, and the top rises into a fleur de lis of six leaves, three of which are erect and three pendent; out of this flower arises a mound formed of a large amethyst, garnished with precious stones, and upon the mound is a cross pattée of jewels, with a large diamond in the midst.

The sceptre is a more ancient emblem of royal dignity than the crown itself. Homer makes it the only cognizance of the Grecian kings; and the historian Justin declares that the ancient kings of Rome used no other ensign of royalty. The Greek poets describe the gods as bearing sceptres to indicate their empire, and declares that an oath taken on the sceptre was the most solemn that could be sworn. In Jacob's remarkable prediction of the Messiah, we find the sceptre specifically mentioned as the emblem of regal power: "the sceptre shall not depart from Judah, nor a lawgiver from between his feet, until Shiloh come." Justin tells us that among the Romans the sceptre was originally a spear; but the sceptres described by Homer were simply long walking-staves, designed to show that the monarchs ruled by acknowledged right, and not by force. Le Gendre tells us that in the first race of the French kings the sceptre was a golden rod, almost always of the same height as the king who bore it, and crooked at one end, like a crosier or pastoral staff.

The queen-consort's sceptre in England is formed like the king's, but it is shorter.

QUEEN'S SCEPTRE.

In the inventory of the Regalia destroyed in the time of the Commonwealth, we find the following entries of sceptres:—

Two sceptres, weighing 18oz., 60*l.*

Two sceptres, one sett with pearles and stones, the upper end gould, the lower end silver. The other silvar gilt, with a dove, formerly thought gould, 65*l.* 16*s.* 10½*d.*

SCEPTRE WITH DOVE.

The sceptre is placed in the king's right hand, and in his left, during the ceremony of investiture, he takes the VIRGE, or rod, which is carried before him in the concluding procession. The distinction between the sceptre and the rod is that the former is surmounted by a cross, and the latter by a dove. This distinction is of very ancient date, and we find that it was observed in the ceremonial of the coronation of Richard the First. The virge of the English sovereign is of gold, richly adorned with precious stones; at the top is a globe and cross, surmounted with a dove enamelled white, and the globe is surrounded with a circle of rose diamonds.

The queen-consort's virge is made of ivory, garnished with gold, and surmounted by a dove enamelled white; it is rather more than a yard in length.

QUEEN'S VIRGE, OR IVORY ROD.

In the year 1814 another virge was found at the Jewel Office in the Tower, covered with dust, and hidden on a back-shelf. It was supposed to have been used at the coronation of William and Mary, when both the king and queen were invested with sovereign power.

ST. EDWARD'S STAFF.

ST. EDWARD'S STAFF, which is carried before the sovereign in the procession which precedes the coronation, is a staff or sceptre of gold, four feet eleven inches in length, having a foot of steel about four inches in length, with a mound and cross at the top; the ornaments are of gold, and the diameter of it is upwards of three-quarters of an inch.

The following is an account of the virges or rods destroyed, with the rest of the Regalia, in the time of the Commonwealth:—

A long rodd of silver gilt, 1lb 5oz., 4*l.* 10*s.* 8*d.*

One staff of black and white ivory, with a dove on the top, with binding and foote of gould, 4*l.* 10*s.* 0*d.*

A large staff, with a dove on y^e^ top, formerly thought to be all gould; but upon triall found to be the lower part wood within, and silver gilt without, weighing in all 27 ounces, valued at 35*l.* 0*s.* 0*d.*

One small staff, with a floure de luce on the topp, formerly thought to be all of gould, but upon triall found to be iron within and silver gilt without, 2*l.* 10*s.* 0*d.*

A dove of gould, sett with stones and pearles, p. oz. 8½ ounces, in a box sett with studds of silver gilt, 26*l.* 0*s.* 0*d.*

The ORB, Mound, or Globe, which is put into the sovereign's hand immediately before the crown is placed upon his head, and is borne in the left hand during the subsequent procession, is a ball of gold, of six inches diameter, encompassed with a band of the same, embellished with roses of diamonds, encircling other precious stones, and edged about with pearl. On the top is a very large amethyst, of a violet and purple colour, near an inch and a half in height, of an oval form, and being encom-

THE ORB.

passed with four silver wires, becomes the pedestal of a splendid cross of gold, of three inches and a quarter in height, and three inches in breadth, set very close with diamonds, having in the middle, a sapphire on one side, and an emerald on the other. It is also embellished with four large pearls in the angles of the cross, near the centre, and three more at the end of it. The whole height of the orb and cross is eleven inches. There is another globe among the crown jewels, which was made for the coronation of William and Mary, but it is not now used at the coronation of queens consort.

The orb or globe was assumed as a cognizance by the Emperor Augustus; it was sometimes called an apple, and sometimes a hill, but in all cases it was regarded as the symbol of universal dominion. The cross was added to the globe by Constantine, the first Christian emperor. Suidas, describing the statue of the Emperor Justinian, says, "In his left hand he held a globe in which a cross was fixed, which showed that by faith in the cross he was emperor of the earth. For the globe denotes the earth, which is of like form, and the cross denotes faith, because God in the flesh was nailed to it."

The globe and cross were first introduced as ensigns of imperial authority in western Europe by Pope Benedict the Eighth, who gave them to the Emperor Henry the Second. The combined ornament was called, "The Imperial Apple," and at the coronation of the emperors of Germany, it was borne on the right hand of the emperor, by the Count Palatine of the Rhine.

GREAT SEAL OF HENRY THE FIRST.

Almost all the English kings from Edward the Confessor, have the globe in their left hand on their coins or seals, as shown in the above engraving; and it seems also to have been frequently so placed when sovereigns lay in state after their decease.

Four Swords are used at the coronation of a British sovereign. 1. The Sword of State, which is a large two-handed sword, having a splendid scabbard of crimson velvet, decorated with gold plates of the royal badges in the following order. At the point is the orb or mound, then the royal crest of a lion standing on an imperial crown; lower down are a portcullis, harp, thistle, fleur de lis, and rose; nearer the hilt the portcullis is repeated; next are the royal arms and supporters; and lastly, the harp, thistle, &c., over again. The handle and pommel of the sword are embossed with similar devices in silver gilt, and the cross is formed of the royal supporters, the lion and the unicorn, having a rose within a laurel between them on one side, and a fleur de lis similarly encircled on the other.

2. Curtana, or the pointless Sword of Mercy, is the principal in dignity of the three swords which are borne naked before the sovereign at the coronation. Mr. Arthur Taylor, in his "Glory of Regality," derives its name from that wielded by Ogier the Dane, in the romances of chivalry; however that may be, it is certain that a sword named Curtana, or Curtein, formed a part of the English Regalia from very ancient times, for Matthew Paris informs us that a sword of that name was carried at the coronation of Henry the Third, by the Earl of Chester. (A. D. 1236.) In the same way, a sword called *Joyeuse*, supposed to have belonged to the Emperor Charlemagne, was always displayed at the coronation

THE CURTANA.

of the kings of France. Curtana is a broad bright sword, the length of the blade is about thirty-two inches, and the breadth almost two inches; the handle, which is covered with fine gold wire, is four inches long, and the pommel, an inch and three-quarters; which, with the cross, is plain and steel gilt: the length of the cross is eight inches nearly. The scabbard belonging to it is covered with a rich brocaded cloth of tissue, and studded with gilt ornaments.

3. The Sword of Spiritual Justice is pointed, but somewhat obtuse; the length of the blade is

SWORD OF SPIRITUAL JUSTICE.

forty inches, and the breadth an inch and a half. The pommel, handle, cross, and scabbard, are precisely similar to those of Curtana.

4. The Sword of Justice of the Temporality is sharp-pointed; the length of the handle is four

SWORD OF THE TEMPORALITY

inches, the pommel an inch and three-quarters, and the cross seven inches and a half. The scabbard is in all respects similar to that of Curtana.

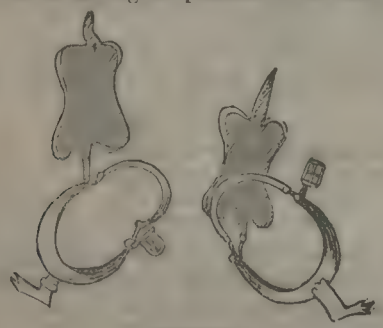
The sovereign's Coronation Ring, called by some ancient writers, "The wedding-ring of England," is of pure gold, with a large table ruby, of a violet colour, on which a plain cross, or cross of St. George, is beautifully enchased. The coronation ring of the

KING'S RINGS. QUEEN'S RING.

queen consort is likewise gold, with a large table ruby set therein, and sixteen other small rubies set round about the ring; of which those next to the setting are the largest, the rest diminishing in proportion. Investiture by the ring, was the most ancient form of conferring dignity; it was by this ceremony that Pharaoh created Joseph his viceroy over Egypt; it was also a Persian custom, as we have already noticed, and we find many traces of it in the history of the Anglo-Saxons.

The legend of the Coronation Ring is not less singular than that of the Ampulla. It is said that King Edward the Confessor was met by an old man who asked him for alms, and the charitable monarch, being at the moment destitute of money, gave the suppliant his ring. Soon afterwards, two English pilgrims in Palestine having lost their way, were met at the approach of night by this same old man, who led them into a certain magnificent city, which appears to have been the New Jerusalem, the present existence of which was a popular article of faith in the middle ages. The old man entertained them most hospitably, and gave them lodgings for the night. In the morning he informed them that he was St. John the Evangelist, of whom it was believed by many of the ancient fathers, that he was appointed to tarry on earth until the second coming of the Lord Jesus. St. John told the pilgrims, that it was to him in person that the Confessor had given the ring, and he sent it back by them to the king, with a promise that divine grace should encircle every British sovereign who was invested with this ring at the coronation. The sacred ring was long preserved at the shrine of St. Edward, and only brought out at the time of a coronation. It deserves to be remarked, that legends of the appearance of St. John continued to be told so late as the reign of Henry the Eighth; his last visitation was to the King of Scotland, James the Fourth; the appearance of the evangelist is thus described by Pitscottie, whose language we have slightly modernized.

He was a man, clad in a blue gown, and belted about him in a roll of linen cloth; a pair of buskins on his feet, to the great of his legs, with all other hose and clothes conform thereto; but he had nothing on his head save hair of a reddish yellow behind, and the same on his cheeks, which went down to his shoulders; but his forehead was bald and bare. He seemed to be a man about fifty-two years old, and he carried a great pikestaff in his hand.



THE SPURS.

The SPURS, called the great golden spurs, are elaborately wrought, both round the outer edge, and at the buckle and fastenings. They have no rowels, but end in an ornamented point, being of that kind which are denominated prick spurs. It is sufficiently notorious, that putting on the gilded spurs, was the ancient investiture of knighthood, just as the hacking them off was the legitimate form of degradation.

The ARMILLÆ, or bracelets, are of solid gold, and open by a hinge for the purpose of being placed upon the wrist. They are an inch and a half in breadth, and two inches in diameter, and are adorned with chasings of the rose, thistle, harp, and fleur de lis, emblematical of England, Scotland, Ireland, and France; the edges are also garnished with pearls. These ornaments are not now employed in the coronation, and we shall see in a subsequent chapter, that the service appropriated to the bracelets, has been by some strange blunder, transferred to the Armil, or Stole.

THE TURNIP-FLY, (*Athalia centifolia.*)

THE following is a more detailed description of the little insect already noticed*. Mr. Yarrell has described the hymenopterous insect, shown in the engraving, as having proved equally injurious. The substance of the following account is extracted from his valuable paper in the *Transactions of the Zoological Society of London.* After noticing the beetle we have already described, he continues,—

But the destroyer of a very large proportion of the turnip-crop, on the light and chalky soils of this country, during the last dry Summer, (1834,) is an insect of a different kind, and one that happily does not make its appearance in great numbers, except at wide intervals, and during those seasons that are remarkable for the almost total absence of rain. The first public notice I am acquainted with on the subject of this particular insect, and the extent of the injury it inflicts, is in the *Transactions of the Royal Society for* 1783, in which W. Marshall, Esq., an agriculturist in Norfolk, details at some length the particulars of the appearance of the turnip-fly during 1782.

In that year many thousands of acres were ploughed up, and the season was too far advanced to attempt the growth of a second crop.

It was observed (says Mr. Marshall,) in the canker-year above mentioned, that prior to the appearance of the caterpillars, great numbers of yellow flies were seen busy among the turnip-plants, and it was then suspected that the canker was the caterpillar state of the yellow-fly. Since that time it has been remarked, that cankers have regularly followed the appearance of these flies. From their more frequently appearing on the sea-coast, and from the vast quantities which have I believe been observed, at different times, on the beach washed up by the tide, it has been a received opinion among the farmers, that they are not natives of this country but come across the ocean, and observations this year greatly corroborate the idea. Fishermen upon the eastern coast declare, that they actually saw them alight in cloud-like flights; and from the testimony of many, it seems to be an indisputable fact, that they first make their appearance upon the eastern coast, and moreover, that, on their first being observed, they lie upon and near the cliffs, so thick and so languid, that they might be collected into heaps, lying, it is said, in some places two inches thick; from thence they proceeded into the country, and even at the distance of three or four miles from the coast they were seen in multitudes resembling a swarm of bees.

From whatever source these insects first reached this country, there is little doubt of their being at the present time naturalized.

Early in July, 1835, the yellow fly was again seen in abundance upon the young turnips, and it was recollected by some that this was the fly which prevailed also in the year 1818, and which was followed by the caterpillar, which they knew by the name of the *blacks.* Another observer said, 'It is of no use hoeing these turnips, for I perceive this year a fly which is the fore-runner of the *nigger* caterpillar.'

These predictions were soon verified. The female fly, by means of a delicately serrated instrument under the tail, is enabled to make a small aperture on the under-surface of the leaf of the turnip, in which she deposits a single egg, and each female produces and deposits in different places about twenty of these eggs. In eight or ten days the eggs are hatched, and the dark-coloured caterpillars crawl forth, and commence the work of destruction, by feeding voraciously on the soft part of the leaf of the turnip, leaving the fibres untouched; after a few days they cast their black skins, and then assume one of a more slaty or gray appearance; they still continue, however, to feed on the leaves, passing from one to another. The destruction is complete; a whole field, in a very short time, presenting only an assemblage of skeleton-like leaves, and this too even when the turnip has attained a considerable size. The

See *Saturday Magazine*, Vol. VII., p. 181.

caterpillar having passed through this feeding-stage of its existence, buries itself in the ground, where it forms for itself a strong oval *cocoon*. Some of the early broods very rapidly enter their last stage of existence, and appear as the little fly, represented in the engraving.

The fly itself is about a quarter of an inch in length, the breadth of the wings extended, about two-thirds of an inch; the larva, or caterpillar, is from half an inch to five-eighths in length.

Although this insect only attacks the leaf, the turnip itself becomes pithy, and of comparatively little value.

Of the degree of success which attended the various remedial measures adopted, I possess but little precise information. On a former visitation of this insect in the county of Kent, some farmers it is stated, saved those fields in which the injury had scarcely begun by turning in hundreds of ducks, a boy going before them with a long pole, brushing the caterpillars off the leaves of the plants; and it is added, it was an amusing sight to observe the ducks waddling after their courier, and devouring the insects with avidity, eyeing both sides of every leaf, lest they should miss such palatable morsels. A heavy roller passed over the ground in the evening, when the caterpillars were at their feed, was another remedy resorted to. But that which was considered the most effectual, was the strewing of quick-lime by broad-cast over the ground, and renewing it when dispersed by the wind; by this means I was told one field of turnips, near Dover, was saved, though surrounded by others which suffered severely, where no such preventative was employed.

RECREATIONS IN NATURAL PHILOSOPHY.

No. II.

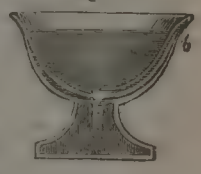
THE LEVEL SURFACES OF LIQUIDS.

THERE is not presented to us in the whole range of our experience, any instance of a level surface more perfect than the general surface of a liquid. A still lake or pond, or the water in our cisterns and water-jugs, are all equally level at the surface. They require none of man's agency to make them so, for they become so whether he wills it or not. We take advantage of this property to assist us in determining the level of a piece of ground in surveying. A bubble of air is enclosed in a tube, containing a liquid; and the surveyor places the tube horizontally, and knows when it is quite level by observing that the bubble of air is in the middle of the length of the tube. The liquid has then no tendency to drive the air-bubble in one direction more than another, and therefore the bubble remains in the middle, from which circumstance the surveyor knows that any piece of wood or other surface, on which the tube is resting is level. This tube he calls a *spirit-level*. The liquid employed in the tube is usually coloured spirit, because pure spirit, or alcohol, is never frozen, however great the cold may be to which it is exposed.

The reason of this perfect level, to which the surface of a liquid attains, is, that liquids, like every other body, tend towards the centre of the earth; and that as the particles of water move freely among themselves, any unequal pressure is soon communicated to surrounding parts. Suppose now that we had a large cistern of water, and that the surface of the water were three or four inches higher near one end of the cistern than near the other: there would be a larger amount of water, a greater number of particles pressing on the bottom of the cistern at the former part than at the latter. Each particle presses on that which is beneath it; and as there would be a loftier column of particles at one part of the cistern than at another, those particles which are near the bottom of the heavier column would press on those that surround them, and force them upwards; in order, in fact, to allow room for themselves to escape from some of the pressure which they experience. There continues to be this pressure until the surface is level in every part, when, as all parts of the liquid near the bottom are equally pressed, no one can yield to another, and they all remain in equilibrium, (a word which means *equal-balanced*).

It appears, therefore, that as soon as the surface of a liquid becomes, from any cause, out of the level direction, a commotion and a kind of struggle takes place, and does not cease until the level is again attained. There is a very pretty experiment which shows this tendency of liquids to maintain a perfect level, and to descend whenever an opportunity offers for so doing. Fig. 1 represents the section of a vessel or basin, which exhibits the paradoxical property of never becoming full, however much water may be poured into it. The vessel looks neither like a sieve nor a cullender: no holes can be seen in it, and no water is seen to flow from it. A little inspection of its construction will, however, enable us to solve this riddle. It may be seen that the vessel is sufficiently thick to have a groove or channel cut in it. At the bottom of the vessel at *a*, there is a small opening, which leads into a channel ascending to the point *b*, and from thence descending to the point *c*, where it is enclosed in the foot or stand of the vessel, which is hollow. Now when water is poured into this vessel, some of it enters the little channel at *a*, and ascends as fast as more water is poured into the vessel. Just before the vessel is quite full, the water ascends to that part of the channel which begins to turn downwards, and immediately on attaining that level, the water flows down the outer channel as fast as it is poured into the vessel, provided that it be not done too quickly. There is a conveyance for carrying off the water from the lower cistern at *c*, by a concealed pipe, not shown in the figure.

Fig. 1.



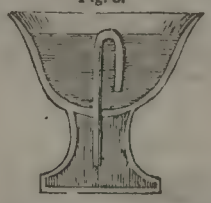
Here then we have an instance of the tendency of water to keep a constant level, whether it branch out into two or three streams, or remain in one body. The water ascends in the narrow channel just as fast as in the broad open part of the vessel; and when it arrives at the level of the bend in the channel, instead of rising still higher in the vessel, it turns into the descending part of the channel, and so flows out.

This property has been made the ground-work of an amusing experiment. Fig. 2 is a philosophical toy, called the *Cup of Tantalus*. A little figure of a man or boy is sitting in the cup, and his face is made to express great anxiety to obtain something to drink, but that he can never obtain. If we pour water into the cup, it will rise just to the level of his chin, but no higher, and the little martyr to thirst is obliged to keep his lips dry whether he will or no.

Fig. 2.

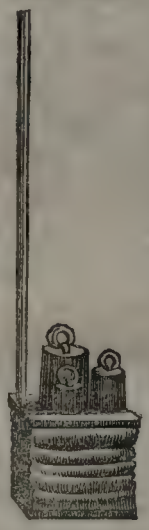
The mystery is ingenious, and is very similar to the experiment which we last described. A double tube passes through the body of the figure, having an ascending part, whose mouth is within the cup, and communicating with the water, and a descending part, whose mouth, M, is concealed in the hollow, D C, of the vessel. When the water is poured into the vessel, it ascends the tube in the interior of the figure; but as the tube bends downwards, when it reaches the level of the chin of the figure, no sooner does the water in the vessel reach that level than it begins to descend the tube to M, and so escapes; leaving the head of the figure quite untouched by the water. The tube in the figure being very small, its course cannot well be traced; but the subjoined figure (fig. 3,) will show the principle more clearly. The shorter leg of the bent tube is open to the water, and when the latter ascends to the level of the bend in the tube, it flows over that bend, and escapes at the exterior mouth of the tube.

Fig. 3.



The strong tendency of water to maintain a constant level at different parts of its surface is strikingly shown in a piece of mechanism, called the Hydrostatic Bellows. The experiment is sometimes called the Hydrostatic Paradox, from the strange result at which we arrive. Fig. 4 represents two boards, connected by edges of leather, which admit of the boards being separated more or less from each other, much in the some manner as the two boards of a pair of bellows. The leather sides are perfectly watertight at their connexion with the boards. A small hole is made in the upper board, and into this a pipe is fixed, which ascends to some height. When the apparatus contains nothing but air, the upper board almost rests upon the lower, as the leather sides form into a number of folds. When water is poured down the tube it enters between the boards, and gradually lifts up the upper one, notwithstanding the large surface of the board compared with the small diameter of the pipe. Suppose, for instance, that the tube becomes half-full of water, while a portion also is situated in the bellows; the surface of the water in the tube is at a higher level than the surface of that in the bellows; and thus arises that pressure and forcible straining after equality of position, to which we lately alluded. But so long as the upper board remains in one position, that adjustment cannot take place; accordingly, the water in the tube, by pressing on the water in the bellows, makes the latter press upward against the upper board, and urges it up with great force, insomuch that a few ounces of water in the tube will raise, not only the upper board of the bellows, but several heavy weights placed upon it. If the pipe were half an inch in diameter, and the boards of the bellows were two feet square, and if half a pint of water were poured into the tube, the water would raise the upper board with upwards of a thousand pounds weight pressing upon it. It is true that the *distance* through which this enormous weight would be lifted is not above a thirty-sixth part of an inch; but the fact, that it will be raised even that small amount, is sufficiently remarkable.

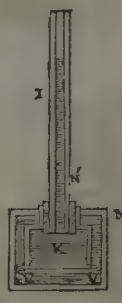
Fig. 4.



If the tube be half an inch in diameter, whatever weight of water there may be in the tube, as many times that pressure will be exerted on the inner surface of the upper board of the bellows, as there are circular half inches in the surface of that board; it is on this account that such a small quantity of water in the tube will exert such an enormous pressure within the bellows. But we have now to mention a very remarkable extension of this law. If the tube contain air instead of water, and if that air can be made to press with more than its usual force on the water beneath, the water will be forced up against the upper board, and will raise it, just the same as if the tube contained water. This truth is shown in a striking manner. A man stands upon the upper board of the bellows, and applying his mouth to the top of the tube, blows down through it; and as he does so, the board on which he stands rises gradually upward, lifting him at the same time. It has a very uncommon effect to see a man raise himself by blowing through a tube. The explanation is this: by blowing forcibly into the tube, he adds to the air already existing in the tube an additional quantity from his own lungs, so that a large quantity of air is confined in a small space. Whenever this occurs, the air exerts a powerful pressure; and in this instance the pressure is felt by the water beneath, which is forced up against the upper board of the bellows, in the same manner as when the tube contained water instead of air. This power of raising a great weight by a small pressure, has caused this experiment to be called the *hydrostatic paradox:* the term hydrostatic being applied to anything which relates to the pressure and equilibrium of liquids.

If a water-butt with a tight-fitting cover be completely full of water, and a tall tube be fixed in the top of the butt, and the pipe be filled with water so as to form a communication with the water in the butt, the butt will burst asunder with great violence by the pressure of the water contained in the pipe.

When water confined in one vessel can communicate with water confined in another vessel, a pressure exerted upon any part of the water is transmitted throughout the whole of the liquid. Thus in fig. 5, the vessel N contains another vessel K within it, the bottom of which, V V, is not fixed, but simply suspended. If into the neck of the outer vessel we attach firmly a tube N', and pour water into it so as to fill N and K, and a portion of the tube above I, considerable pressure will be exerted upon the water in the two vessels, but it will be equal in both, and so equally distributed, that if the bottom V V of the inner vessel be supported only by slight threads or horse-hair, it will not be detached from K; the reason is, that the downward pressure is counteracted by the upward pressure and these two forces destroy each other.



WITHOUT reason, as on a tempestuous sea, we are the sport of every wind and wave, and know not, till the event hath determined it, how the next billow will dispose of us; whether it will dash us against a rock, or drive us into a quiet harbour.—LUCAS.

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QUEEN ELIZABETH; HER PROGRESSES AND PUBLIC PROCESSIONS. No. VII.

ANCIENT VIEW OF CORNHILL, WITH THE PROCESSION OF QUEEN ELIZABETH.

PROCESSION THROUGH THE CITY FROM THE TOWER TO WESTMINSTER, THE DAY BEFORE HER MAJESTY'S CORONATION.

In the early ages of our history, it was customary for the sovereign, on the day previous to the coronation, to proceed in great state through the city of London, from the Tower to the palace at Westminster; and for this purpose it was necessary for the monarch, two or three days beforehand, to remove from the palace, and take up a temporary abode in the fortress. The pomp and splendour of some of these processions are not surpassed by anything of state pageantry recorded in our history; and we may venture to instance those which preceded the coronations of Henry the Eighth, and his three children, Edward the Sixth, Mary, and Elizabeth, as affording a display of magnificence scarcely ever equalled. The age in which those sovereigns reigned was one delighting in costly shows and spectacles; seldom afterwards do we read of streets decked with silks, and tapestries, and gold brocades, and conduits running with wine, and standards and crosses newly painted and newly burnished, with here and there a fanciful pageant abounding in allegorical devices, so exceedingly ingenious as to require a lengthy explanation, all for the purpose of welcoming a royal visiter, and testifying the affection which his subjects bore towards him. The extreme popularity which Henry the Eighth enjoyed at his accession, a popularity arising as well from the captivating nature of his personal qualifications, as from the circumstance of his uniting in his person the rival claims of the houses of York and Lancaster, will account for the peculiar splendour which characterized his reception by the citizens of London. To his popularity, likewise, may be referred much of the rejoicing which greeted his next three successors; the strong attachment which his subjects had conceived for him in his better days, rendered the children of "old king Henry theyght," objects of popular affection, without reference to their individual merits, or to the particular circumstances under which they ascended the throne. Even his daughter Mary, in spite of her known attachment to popery, was readily supported by the people against the unlawful attempt of the Duke of Northumberland to secure the crown for Lady Jane Grey; and her passage through the city on the 30th of September, 1553 the day before her coronation, was marked by great splendour. Such being Mary's reception, it was natural that Elizabeth should experience an especially

joyful and hearty welcome, when she came to the throne; for she had become endeared to the people by the persecution which she had suffered in her sister's reign, on account of her attachment to the reformed faith.

The pageants which were devised by the citizens of London for the entertainment of Elizabeth in her procession through the city, on the day preceding her coronation, afford an instructive illustration of the taste of the age; and it happens fortunately that we possess a circumstantial account of the whole ceremony in a very interesting tract, which was published a few days afterwards. This tract is entitled, *The passage of our most drad and Soveraigne Lady Quene Elyzabeth, through the citie of London to Westminster, the daye before her Coronation, Anno* 1558*; and at the close of it we are informed that it was *Imprinted at London, in Flete-strete, within Temple-barre, at the signe of the Hand and Starre, by Richard Tottil, the xxiii. day of January. Cum privilegio.*

The opening passage well describes in the stately style of the age, the sort of reception which the queen experienced:—

Upon Saturday, which was the 14th day of January, in the yere of our Lord God, 1558, about two of the clocke at after noone, the moste noble and Christian princesse, our most dradde soveraigne ladye Elyzabeth, by the grace of God, Quene of Englande, Fraunce, and Irelande, Defendour of the Faith, &c.† marched from the Towre to passe through the citie of London towarde Westminster, richely furnished and most honourably accompanied, as well with gentlemen, barons, and other the nobilite of this realme, as also with a notable trayne of goodly and beautifull ladies richly appoynted. And entring the citie, was of the people received marveylous entirely, as appeared by the assemblie, prayers, wishes, welcomminges, cryes, tender woordes, and all other signes, whiche argue a wonderfull earnest love of most obedient subjectes towarde theyr soveraigne. And on thother side, her grace, by holding up her handes and merie countenaunce to such as stode farre of, and most tender and gentle language to those that stode nigh to her grace, did declare herselfe no less thankefullye to receive her people's good wyll, than they lovingly offered it unto her. To all that wyshed her grace well, she gave heartie thankes; and to such as bade God save her grace, she sayde againe God save them all, and thanked them with all her heart: so that on eyther side there was nothing but gladnes, nothing but prayer, nothing but comfort. The quene's majestie rejoysed marveilously to see that so exceadingly shewed towarde her grace, which all good princes have ever desyred; I meane so earnest love of subjectes, so evidently declared even to her grace's owne person, being carried in the middest of them. The people again were wonderfully ravished with the loving answers and gestures of theyr princesse, like to the which they had before tryed at her first comming to the Towre from Hatfield. Thus her grace's loving behaviour, preconceived in the people's heades upon these considerations, was then thoroughly confirmed, and indede emplanted a wonderfull hope in them, touchyng her woorthy government in the reste of her reygne. For in all her passage she did not only shew her most gracious love toward the people in generall, but also privately, if the baser personages had offered her grace any flowers, or such like, as a significacion of their good wyll, or moved to her any sute, she most gently to the common rejoysing of all the lookers on and private comfort of the partie, staid her chariot and heard theyr requestes; so that if a man should say well, he could not better tearme the citie of London that time than a stage, wherein was shewed the wonderfull spectacle of a noble-hearted princesse towards her most loving people, and the people's exceeding comfort in beholding so worthy a soveraigne, and hearing so prince-like a voice which could not but have set the enemy on fyre, since the vertue is in the enemie always commended much more could not but enflame her naturall obedient and most loving people, whose weale leaneth onely uppon her grace and government.

The first incident in the procession was at "Fanchurche," near which was erected a richly-furnished scaffold, "whereon stode a noyes of instruments, and a chylde in costly apparell." When the queen came up she ordered her chariot to be stayed, and the noise to be stopped, while the child delivered a welcoming oration, "on the hole cities behalfe." This address was in verse, as follows:—

O pereles soveraygne quene, behold what this thy town
Hath thee presented with at thy fyrst entraunce here;
Beholde with how riche hope she ledeth thee to thy crown,
Beholde with what two gyftes she comforteth thy chere.

The first is blessing tonges, which many a welcome say,
Which pray thou maist do well, which praise thee to the sky,
Which wish to thee long lyfe, which blesse this happy day,
Which to thy kingdome heapes, all that in tongues can lye.

The second is true hartes, which love thee from their roote,
Whose sute is triumphe now, and ruleth all the game,
Which faithfulness have wone, and all untruthe driven out;
Which skip for joy when as they heare thy happy name.

Welcome, therefore, O quene, as much as harte can thinke;
Welcome againe, O quene, as much as tong can tell;
Welcome to joyous tonges and hartes that will not shrinke;
God thee preserve we praye, and wishe thee ever well.

"At which wordes of the last line," continues the narrator, "the hole people gave a great shout, wishing with one assent as the chylde had said." A copy of the verses was fastened upon the scaffold, and on another tablet was a Latin version of the same.

From Fenchurch the queen proceeded towards *Gracious Streate*, where "at the upper ende, before the signe of the Egle, the citie had erected a gorgeous and sumptuous arke." A platform stretched across the street, and in the middle of it rose three stages, one above the other. Upon the lowest stage were personages representing King Henry the Seventh and Elizabeth of York, his queen, with their respective emblems, the red and white rose, and "so set that the one of them joined hand's with thother, with the ring of matrimonie perceived on the finger." From the two roses, two branches gathered into one, sprang up towards the second stage, whereon was a representation of King Henry the Eighth, and "the right worthy ladie Quene Ann," the mother of Elizabeth. From this stage proceeded a branch towards the third or uppermost, on which was set a representation of the queen herself, "crouned and apparalled as thother prynces were." In front was a standing place for a child, who was appointed to address the queen, and explain the meaning of the pageant; and the sides were "filled with loude noyses of musicke." Latin sentences, inculcating the necessity of unity and concord, were scattered over the erection; red and white roses "garnished" it very appropriately; and on the front, "in a faire wreathe," was written the name and title of the pageant, "The uniting of the two Houses of Lancastre and Yorke."

This pageaunt was grounded upon the quenes majesties name. For like as the long warre betwene the two howses of Yorke and Lancastre then ended when Elizabeth, doughter to Edward the Fourth, matched in mariage with Henry the Seventhe, heyre to the howse of Lancastre; so

* Or 1559, according to the language of history. The reader will recollect that previous to the reformation of our calendar, by the Act passed in 1751, the civil, legal, and ecclesiastical year began on the 25th of March, and not as now on the 1st of January; and that it was only the *historical* year, or that used conventionally by historians in measuring the march of events, which began on the 1st of January. The tract mentioned in the text, assigns the official date of January 15, 1558, to the coronation of Elizabeth; the year 1558, *legally* speaking, not ending until the 25th of March; whereas historians, regarding the year 1558 as having expired before the 1st of January, refer an event occurring on the 15th of January to the year 1559.

† In one of the Harleian MSS. referred to by Nichols, her Majesty's title occurs thus: "The most high and mightye Princesse, our dread sovereigne Lady Elizabeth, by the Grace of God, Quene of England, France, and Irelande, Defender of the trew auncient and Catholic faithe, most worthy Empresse from the Orcade Isles to the Mountaynes Pyrenei. A Larges! A Larges! A Larges!"

since the quenes majesties name was Elizabeth, and forsomuch as she is the onelye heire of Henry the Eighth, which came of bothe howses, as the knitting up of concorde, it was devised that, like as Elizabeth was the first occasion of concorde, so she, another Elizabeth, myght maintaine the same among her subjectes, so that unitie was the ende whereat the whole devise shotte.

The verses here addressed to the queen were these :—

The two princes that sit under one cloth of state,
The man in the redde rose, the woman in the white,
Henry the Seventh and Queene Elizabeth his mate,
By ring of marriage as man and wife unite.

Both heires to both their bloodes, to Lancastre the kyng,
The quene to Yorke, in one the two howses did knit:
Of whom as heire to both, Henry the Eighth did spring,
In whose seat his true heire, thou Quene Elizabeth doth sit.

Therefore as civill warre, and feude of blood did cease,
When these two howses were united into one,
So that now jarrs shall stint, and quietnes encrease,
We trust, O noble quene, thou wilt, because alone.

It appears that the queen's loving subjects were extremely noisy in expressing their joy at the sight of their "moste dradde soveraigne ladie;" for before she "came wythin hearing of thys pageaunt, she sent certaine, as also at all the other pageauntes, to require the people to be silent, for her majestie was disposed to heare all that shoulde be sayde unto her." After the meaning of the pageant had been explained, Elizabeth thanked the city, and praised the fairness of the work, promising to do her utmost for the continual preservation of concord.

Proceeding towards Cornhill, amid the loudest rejoicings, the queen passed the conduit, which was curiously trimmed "with riche banners adourned, and a noyse of loud instrumentes upon the top thereof," and directly espied the second pageant standing at the lower end of Cornhill. This pageant, which represented her majesty in the seat of government, supported by certain Virtues treading under foot the antagonist Vices, affords an excellent illustration of the spirit and manners of the times. It extended across the street, and displayed three open gates; over the middle was erected a chair or "seate royall, with a clothe of estate to the same apperteynyng," in which was a child representing the queen.

And in a comely wreathe artificiallie and well devised with perfit light and understanding to the people, in the front of the same pageaunt was written the name and title thereof: which is 'The Seate of worthie Governance,' whych seate was made in such artificiall maner as to the apperance of the lookers on, the forparte semed to have no staye, and therefore of force was stayed by lively personages, which personages were in number foure, standing and staieng the forefronte of the same royall, eche having his face to the quene and people, wherof every one had a table to express their effectes which are vertues; namely, Pure Religion, Love of Subjectes, Wisdom and Justice, which did treade their contrarie vices under their feete; that is to witte, Pure Religion did treade upon Superstition and Ignoraunce, Love of Subjectes did treade upon Rebellion and Insolence, Wisdome did treade upon Follie and Vaine Glorie, Justice did tread upon Adulacion and Bribery. Each of these personages, according to their proper names and properties, had not onely their names in plaine and perfit writing set upon their breastes, easely to be read of all, but also, every of them was aptly and properly apparelled, so that hys apparell and name did agre to expresse the same person that in title he represented.

In every "voyde place" were "pretie sentences" both English and Latin, commending the seat supported by vertues and defacing the vices "to the utter extirpation of rebellion, and to everlasting continuaunce of quyetness and peace." When the queen came up, a child as usual stood forward, and addressed the following lines to her :—

Whyle that Religion true shall ignorance suppresse,
And with her weightye foote break Superstition's head;
Whyle Love of Subjectes shall Rebellion distresse,
And with Zeale to the Prince Insolency doun treade:
While Justice can flattering Tongues and Bribery deface;
Whyle Follie and Vayneglorie to Wisdome yeld their handes,
So long shal Government swerve from her right race,
But Wrong decayeth still, and Righwiseness up standes.
Now all thy subjectes hertes O prince of pereles fame,
Do trust these Vertues shall maintayn up thy throne,
And Vyce be kept doun still the wicked put to shame,
That good with good may joy, and naught with naught may mone.

When the "chyldes oration" was ended, the instruments which had been placed over the side gates gave "an heavenly melodie." The queen, having fully understood the pageant, thanked the city, and graciously promised her good endeavours for the maintenance of the said virtues, and the suppression of the said vices.

Our engraving affords an ancient view of the eastern end of Cornhill, taken from near the corner adjoining Bishopsgate Street. In the foreground appears the pump which formerly stood at the intersection of Gracechurch Street, Cornhill, Bishopsgate Street, and Leadenhall Street. On the right is the church of St. Peter upon Cornhill. On the left, a few yards down Leadenhall Street, appears a portion of the old Leadenhall. We have introduced into the scene a view of Queen Elizabeth's carriage, together with some of the figures found in the royal processions of that age.

The conduit upon Cornhill stood in front of the spot on which the Royal Exchange was afterwards built. The site was originally occupied by a prison called "the Tun," which derived its name from being built "somewhat in fashion of a tun standing on one end." This Tun was erected in 1282 by Henry Wallis, mayor of London, to be a prison "for night-walkers, and other suspicious persons who at that time infested the city;" and the same magistrate is said to have first made the well, "curbed round with hard stone," which stood without the west side of the Tun, and has always in modern times been covered with a pump. In 1401 "the said prison-house called the Tun was made a cistern for sweet water conveyed by pipes of lead from Tyburn, and was from thenceforth called the Conduit upon Cornhill." The well was planked over, and a strong prison of timber, called the Cage, with a pair of stocks in it, was erected for the punishment of disorderly persons; and on the top of the cage was placed a pillory for the punishment of bakers offending in the assize of bread, and other offenders. In 1475, Sir Robert Drope, draper, and mayor, enlarged the conduit, and "castellated it in a comely manner."

Man has called in the friendly assistance of Philosophy, and Heaven, seeing the incapacity of that to console him, has given him the aid of Religion. The consolations of philosophy are very amusing, but often fallacious. It tells us that life is filled with comforts, if we will but enjoy them: and, on the other hand, that though we unavoidably have miseries here, life is short, and it will soon be over. Thus do these consolations destroy each other; for if life is a place of comfort, its shortness must be misery; and if it be long, our griefs are protracted. Thus philosophy is weak, but religion comforts in a higher strain. Man is here, it tells us, fitting up his mind, and preparing for another abode. To religion then we must hold in every circumstance of life, for our truest comforts: for if already we are happy, it is a pleasure to think we can make that happiness unending; and if we are miserable, it is very consoling to think there is a place of rest. Thus to the fortunate religion holds out a continuance of bliss, to the wretched a change from pain.—Goldsmith.

ILLUSTRATIONS OF THE BIBLE FROM THE MONUMENTS OF ANTIQUITY

No. XV.

THE MURMURINGS OF THE CHILDREN OF ISRAEL.

NOTWITHSTANDING the stupendous miracle by which God had delivered his chosen people from Pharaoh and his mighty host, the ungrateful Israelites, in the first moment of difficulty, broke out into almost open rebellion.

And the whole congregation of the children of Israel murmured against Moses and Aaron in the wilderness: and the children of Israel said unto them, Would to God we had died by the hand of the Lord in the land of Egypt, when we sat by the flesh-pots, and when we did eat bread to the full: for ye have brought us forth into this wilderness, to kill this whole assembly with hunger. (Exodus xvi. 2, 3.)

The gracious Jehovah miraculously supplied them with manna from heaven, but even of this they became weary.

The mixed multitude that was among them fell a lusting: and the children of Israel also wept again, and said, Who shall give us flesh to eat? We remember the fish which we did eat in Egypt freely: the cucumbers, and the melons, and the leeks, and the onions, and the garlick: but now our soul is dried away; there is nothing at all, beside this manna, before our eyes. (Numbers xi. 4—6.)

Hence it may be inferred that the Egyptians were a luxurious people, and that they used meat more freely than most other oriental nations. This is very fully confirmed by the monuments; we see in their kitchens large joints of beef and venison, with a plentiful supply of poultry. The "flesh-pots" mentioned by the sacred historian were enormous caldrons in which several joints were frequently boiled together. Indeed, from the profusion displayed in the representations of the royal kitchens, we are led to conclude that the daily supply of provision for the Pharaohs was not inferior to that which Solomon required. The Book of Kings informs us that—

Solomon's provision for one day was thirty measures of fine flour, and three-score measures of meal, ten fat oxen, and twenty oxen out of the pastures, and an hundred sheep, beside harts, and roebucks, and fallow-deer, and fatted fowl. (1 Kings iv. 22, 23.)

This might appear incredible if we did not recollect that oriental sovereigns are generally surrounded by a vast multitude of retainers, who require little remuneration for their services beyond their daily support. The Israelites dwell with great earnestness on "the bread," with which they assert that they were plentifully supplied, and this is not improbable, because, as we have already shown, Egypt produced vast quantities of corn; and bread, and various kinds of pastry, formed the principal part of their food; but the ingratitude and injustice of the Israelites is particularly shown by their demand for flesh, because it is not likely that they would have been able or permitted to use such an expensive article of food, when they were held in bondage by the cruel Pharaoh. Fish was more easily procured, and we have in a former paper shown that the fisheries of Egypt, both in ancient and modern times, were so very productive as to support very heavy imposts. Vegetables are still very abundant in the valley of the Nile, particularly the leeks and onions which the Israelites mention with such fondness. Fruits were also very plentifully supplied both by the date-palm and the sycamore-fig. We find, indeed, that monkeys were employed to collect the fruit of the latter, and it will be seen in the engraving that these crafty animals are not unmindful of their own interests, for they are manifestly helping themselves without

MONKEYS GATHERING FRUIT.

scruple. We find that the Israelites did not forget this important fruit in one of their many murmurings against Moses. Shortly after Korah's rebellion, unwarned by the fearful punishment which had overtaken those who joined that discontented leader,

They gathered themselves together against Moses and against Aaron. And the people chode with Moses, and spake, saying, Would God that we had died when our brethren died before the Lord! And why have ye brought up the congregation of the Lord into this wilderness, that we and our cattle should die there? And wherefore have ye made us to come up out of Egypt, to bring us in unto this evil place? it is no place of seed, or of figs, or of vines, or of pomegranates; neither is there any water to drink. (Numbers xx. 2—5.)

Figs were not only eaten fresh, but were preserved by being pressed together into a cake, and in this way they may be kept for several years. Such cakes must have been a common article of food, for Abigail, anxious to atone for the avarice of her husband Nabal, sent two hundred cakes of figs to David and his followers; (1 Sam. xxv. 18;) and it was with part of a cake of figs that David satisfied the hunger of the Egyptian who guided him to the camp of the Amalekites and enabled him to rescue his two wives, (1 Sam. xxx. 12.) Figs appear also to have been used medicinally, at least as an outward application, for it was by the application of a poultice of figs that the ulcer which threatened the life of Hezekiah, king of Judah, was healed. Isaiah said, "Take a lump of figs. And they took and laid it on the boil, and he recovered." (2 Kings xx. 7.)

In consequence of its utility, the fig-tree was highly valued; it is mentioned with particular honour in Jotham's parable of the trees resolving to elect a king.

And the trees said to the fig-tree, Come thou, and reign over us. But the fig-tree said unto them, Should I forsake my sweetness, and my good fruit, and go to be promoted over the trees? (Judges ix. 10, 11.)

In all descriptions of fertility, the fig-tree is usually associated with the vine; thus Moses declares to the children of Israel that their promised Canaan was

A land of wheat, and barley, and vines, and fig-trees, and pomegranates; a land of oil-olive, and honey. (Deut. viii. 8.)

We also find the most common proverb for describing the tranquillity and fertility of a country was, that "every man should sit under his vine and his fig-tree." The Assyrian ambassador Rabshakeh, made use of this image when he endeavoured to

persuade the Jews to revolt against their pious sovereign, Hezekiah;—

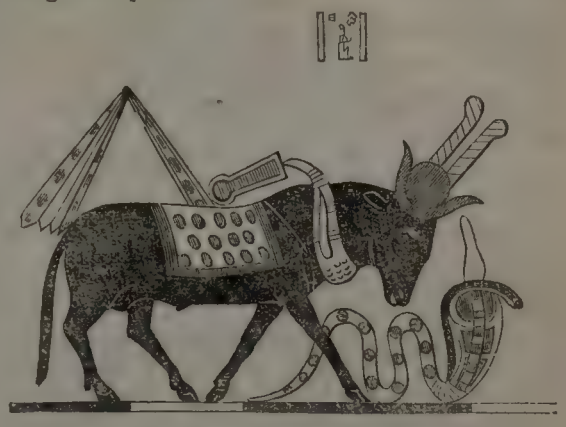
Hearken not to Hezekiah: for thus saith the king of Assyria, Make an agreement with me by a present, and come out to me, and then eat ye every man of his own vine, and every one of his fig-tree, and drink ye every one the waters of his cistern. (2 Kings xviii. 31.)

Another frequent subject of murmuring with the Israelites was the want of water, and this must have been very severely felt by persons who have been accustomed to drink from the delicious streams of the Nile, but having already described the reverence which the Egyptians had for that noble river, it is unnecessary to dwell further on the subject now. We shall, therefore, turn to the flagrant act of idolatry, in which not only the mass of the Israelites, but Aaron himself, the brother of Moses participated.

When the people saw that Moses delayed to come down out of the mount, the people gathered themselves together unto Aaron, and said unto him, Up, make us gods, which shall go before us; for as for this Moses, the man that brought us up out of the land of Egypt, we wot not what is become of him. And Aaron said unto them, Break off the golden ear-rings, which are in the ears of your wives, of your sons, and of your daughters, and bring them unto me. And all the people brake off the golden ear-rings which were in their ears, and brought them unto Aaron. And he received them at their hand, and fashioned it with a graving tool, after he had made it a molten calf: and they said, These be thy gods, O Israel, which brought thee up out of the land of Egypt. And when Aaron saw it, he built an altar before it; and Aaron made proclamation, and said, To-morrow is a feast to the Lord. And they rose up early on the morrow, and offered burnt-offerings, and brought peace-offerings; and the people sat down to eat and to drink, and rose up to play. (Exodus xxxii. 1—6.)

In a former article we have described the great skill of the Egyptians in metallurgy, and noticed the richness of the golden ornaments worn by the women; we only refer to the subject here for the purpose of showing that Aaron could obtain a sufficient supply of the precious metals to form an idol of considerable size, and that the art of working gold was so well known, that he could have no difficulty in preparing an image. The idol was moulded into the shape of a calf, or young bullock, which was worshipped in Egypt under the name of Mnevis, at On, or Heliopolis, as a symbol of the sun. With this form of idolatry the Israelites must have been familiar, because the city of On was in the land of Goshen, and because Joseph, the head of their nation, was connected by marriage with the principal priestly family in Heliopolis. The accompanying engraving is a representation of the Egyptian deity Mnevis, taken from the coffin of a mummy preserved in the museum of Turin; the orb of the sun is represented between his horns, surmounted with ostrich feathers, the symbols of justice, the whip which he carries is emblematic of power, and the serpent before him is supposed to represent the spirit of the gods.

It appears that Aaron intended this idol to be an emblem of Jehovah, for he proclaimed its dedication as "a feast to the Lord;" his sin was, therefore, precisely similar to that committed in many Romish churches, where emblematic figures of the Trinity are constantly worshipped. But the worship of the idol was celebrated with heathenish rites and with heathenish abominations. The Israelites feasted, sung and danced, as the monuments show us that the Egyptians used to do in their religious festivals, and it is probable that they proceeded to very improper and unseemly lengths in their festivities, as we know that the persons whom they imitated frequently practised licentious ceremonies. The noise and shouting reached Moses as he descended from the mountain, and at once revealed to him the nature of their proceedings; he descended to the camp, destroyed the idol, and by some process which required no ordinary degree of chemical skill, reduced the gold to powder



THE SACRED YOUNG BULLOCK.

We have now shown, from the indisputable evidence of the monuments, that the murmurings and rebellions of the Israelites in the desert display characteristics which could only have been manifested by a people which had just come out of Egypt, and have thus given an entirely new series of historical proofs which demonstrate the truth of the wondrous deliverance recorded in the Book of Exodus.

EARTHENWARE.

THERE is scarcely any manufacture which is so interesting to contemplate in its gradual improvement and extension, as that of earthenware, presenting as it does so beautiful a union of science and art, in furnishing us with the comforts and ornaments of polished life. Chemistry administers her part by investigating the several species of earths, and ascertaining as well their most appropriate combinations, as the respective degrees of heat which the several compositions require.

Art has studied the designs of antiquity, and produced from them vessels even more exquisite in form than the models by which they have been suggested. The ware has been provided in such gradations of quality as to suit every station, from the highest to the lowest. It is to be seen in every country, and almost in every house, through the whole extent of America, in many parts of Asia, and in most of the countries of Europe. At home it has superseded the less cleanly vessels of pewter and of wood, and by its cheapness has been brought within the means of our poorest housekeepers. Formed from substances originally of no value, the fabrication has produced labour of such various classes, and created skill of such various degrees, that nearly the whole value of the annual produce may be considered as an addition made to the mass of national wealth.

The abundance of the ware exhibited in every dwelling is sufficient evidence of the vast augmentation of the manufacture, which is also demonstrated by the rapid increase of the population in the districts where the potteries have been established.—*Quarterly Review.*

PLANTS exist *in* themselves: insects *by*, or by means of, themselves: men, *for* themselves. There is growth only in plants; but there is irritability, or, a better word, instinctivity in insects.—COLERIDGE.

CORONATION ANECDOTES. No. III.

HENRY III.

AFTER the death of John, London being in possession of the French prince, Louis, an assembly of the principal authorities was convened at Winchester, under the presidency of Gualo, the papal legate. The principal persons who attended the council were, Peter, bishop of Winchester, Jocelyn, bishop of Bath, Ranulph, earl of Chester, William, earl of Pembroke and earl marshal, William, earl of Ferrers, and Philip of Albany, together with a great number of abbots, priors, and other ecclesiastics. They unanimously resolved that the young king should be crowned on the 28th of October, A. D. 1216. The ceremony was performed in the cathedral of Winchester, by the bishop of that see, aided by the bishop of Bath. The papal legate compelled Henry to do homage to the holy Roman church and Pope Innocent for his kingdom of England and Ireland; he also made him swear that he would pay an annual tribute of one thousand marks to the papal see, as his father had stipulated to do, when he was absolved from the sentence of excommunication. In return for this submission, Gualo excommunicated the French prince, and all his adherents in England. The ceremony of coronation was repeated by Stephen Langton, archbishop of Canterbury, as Holinshed informs us: "Moreover, in the yeare of our Lord 1220, and upon the seaventeenth day of Maie, being Whitsunday, the king was eftsoones solemnelie crowned at Westminster, to the end it might be said that now after the extinguishment of all seditious factions, he was crowned by the generall consent of all the estates and subjects of his realm."

Early in the year 1236, Henry married the Lady Eleanor, daughter to the earl of Provence, whose beauty is celebrated by all the chronicles. Langtoft says:

> Henry kyng our prince at Westminster kirke[a]
> The Erly's douhter of Province, the fairest may[b] o lif[c]
> Beyond the se that wor[d], was non suilh[c] creature.

The ceremony of her coronation was performed with extraordinary pomp on the 22nd of January. Holinshed's account of it will no doubt gratify our readers:—

"At the solemnitie of this feast and coronation of the quene, all the high peeres of the realm both spirituall and temporall were present, there to exercise their offices as to them apperteined. The citizens of London were there in great arraie, bearing afore hir in solemn wise, three hundred and three score cups of gold and silver, in token that they ought to wait upon hir cup. The archbishop of Canturburie (according to his dutie) crowned hir, the bishop of London assisting him as his deacon. The earle of Chester bare the sword of St. Edward before the king, in token that he was earle of the palace, and had authoritie to correct the king, if he should see him to swarve from the limits of justice; his constable of Chester attended him, and remained where the presse was thicke, with his rod or warder. The earle of Pembroke, high marshall, bare the rod before the king, and made roome before him both in the church and in the hall, placing everie man, and ordering the service at the table. The wardens of the Cinque Ports bare a canopie over the king, supported with four speares. The earle of Leicester held the bason when they washed. The earle of Warren in the place of the earle of Arundell, bicause he was under age, attended on the king's cup. M. Michael Bellet was butler by office. The earle of Hereford exercised the roome of high marshall in the king's house. The lord William of Beauchamp was the almoner. The cheefe justice of the forrests on the right of the king removed the dishes on the table, though at the first he was staied by some allegation made to the contrarie. The citizens of London served out wine to everie one in great plentie. The citizens of Winchester had oversight of the kitchen and larderie. And so everie person according to his dutie exercised his roome, and bicause no trouble should arise, manie things were suffered, which upon further advise taken therein were reformed. The chancellour and other ordinarie officers kept their place. The feast was plentifull, so that nothing wanted that could be wished. Moreover in Tothill fields roiall justes were holden by the space of eight daies together."

This account is fully confirmed by Matthew Paris, who adds, that "such was the multitude of peers and peeresses, such the crowd of ecclesiastics, such the assemblage of the lower orders, and such the concourse of minstrels, morrice-dancers, and buffoons, that the city of London could scarcely contain them." And of the coronation feast he says, that "it displayed all the world could produce for glory or delight."

This is the first coronation in which we read of tournaments being introduced, but the most valuable part of Holinshed's description is the reason he assigns for the sword of state being borne by a palatine peer, namely, to show that the palatine nobles had the right of restraining the sovereign when he violated his royal duties.

EDWARD I.

On the 15th, or, as other authorities say, the 19th of August, 1274, Edward I., and his queen Eleanor, were crowned at Westminster by the archbishop of Canterbury, aided by other prelates. We prefer the latter date, because it is that expressly stated by Langtoft, who was a cotemporary.

> In the yere folowand that I rekened here
> Edward com to land, als prince of grete powere
> The next Sonenday after the assumpcioun
> Of Mari moder & may[a], Sir Edward had the coroun.
> In the kyrke of Westmynstere, at the abbay solempnely
> The bishop of Canterbere, Robert of Kilwardeby
> Corouned Edward thore[b], biforn alle the clergy
> And Dame Helianore corouned quene & lady
> Was never at St. Denys feste holden more hy
> Ne was of more pris, ne served so redy[d]
> Was never prince that I writen of fond[e]
> More had treie[f] & tere[g] than he had for his lond.

Holinshed adds some remarkable particulars of this coronation:—

"At this coronation were present, Alexander, king of Scots, and John, earle of Bretaine, with their wives that were sisters to King Edward. The king of Scots did homage unto King Edward for the realme of Scotland, in like manner as other the kings of Scotland before him had doone to other kings of England, ancestoures to this King Edward. At the solemnitie of this coronation there were let go at libertie (catch them that catch might) five hundred great horsses by the king of Scots, the earles of Cornewall, Glocester, Pembroke, and others, as they were allighted fro their backs."

EDWARD II.

Edward II. and his queen were crowned at Westminster on the 24th of February, being the feast of St. Matthias, and Quinquagesima Sunday. The archbishop of Canterbury, who had the right to perform the ceremony, lying under a papal suspension, Pope

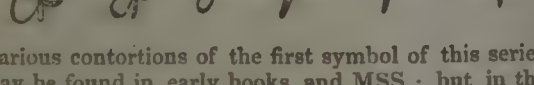
[a] Church. [b] Maiden. [c] Of life, *i. e.* alive. That were beyond the sea, *i. e.* among all foreign nations. [c] No such.

[a] Virgin. [b] There. [c] Magnificent. [d] Readily, cheerfully. [e] Found. [f] Trials or difficulties. [g] Loss, sorrow.

Clement proposed to send over a cardinal to officiate upon the occasion; but Edward rejected the proffer, and prevailed upon the pontiff to grant a commission to the archbishop of York, and the bishops of Durham and London, to perform the office. These prelates refused to sanction such a precedent, and Edward again applied to the pope to remove Archbishop Winchelsey's suspension. Clement assented; but the archbishop, who was out of the kingdom, and confined to his bed by severe illness, delegated his office to the bishops of Winchester, Salisbury, and Chichester. Scarcely was this difficulty removed, when another arose, from the partiality of the weak king for his unworthy favourite, Piers Gaveston; the principal nobles refused to attend the ceremony unless this unpopular minion should be sent out of the kingdom. Edward promised to give them satisfaction on the subject in the next parliament, which he agreed to assemble at the ensuing Easter; but he gave proof of the little reliance that could be placed upon his word, in the council which he held to regulate the procession. Edward disposed of the sceptre, the cross, St. Edward's staff, the spurs, and the swords, with little regard to prudence or precedent; but nothing was more offensive to the nobles than his delivering the crown to be borne by Piers Gaveston, who was dressed finer than the king himself, and outshone everybody in the procession. Gaveston also was appointed to superintend all the arrangements; but he performed his duty so negligently, that, as Holinshed informs us, "There was such presse and throng at this coronation, that a knight, called Sir John Bakewell, was thrust, or crowded to death." The bishops, also, were incommoded, and forced to hurry through the service in a slovenly manner; and yet it was not concluded before three in the afternoon. Great abundance of viands and wines had been provided, but the dinner did not begin until night, and was then badly served; the usual forms of service were neglected, and the whole was a continued scene of confusion, singularly emblematic of the state of the nation, during this monarch's unhappy reign.

PROBABLE ORIGIN OF THE ALGEBRAIC SIGNS + and −.

The sign + (*plus*), indicating addition, was early expressed *et* (and); the forms of its gradual contraction from the *manuscript* form (a good deal similar to the early printed forms,) will be apparent from the annexed series of transformations, all of which are easily verified by a reference to existing documents.



Various contortions of the first symbol of this series may be found in early books and MSS.; but in the one case they are merely for ornamental printing, and in the second for ornamental writing. The spirit which dictated them, still maintains its ground in all parts of the civilized world.

Every one knows that, even in printed books, it was the *general custom* to omit several of the vowels, and draw a line above the preceding letter, to indicate that the vowel should be read there, or as forming an integral part of the sound of which the marked consonant was the commencement. The same was also done for the *m* and *n*. The word *minus*, (less,) was, therefore, thus written, *mn̄s*. Brevity and rapidity led to the substitution of the mere line for the word, and hence is derived the — itself.—*Magazine of Popular Science.*

SAINT SWITHIN.

Come not St. Swithin with a cloudy face,
Ill-ominous; for old tradition says,
If Swithin weep, a deluge will ensue,
A forty days of rain. The swain believes,
And blesses sultry Swithin if he smiles,
But curses if he frowns. So boding dames
Teach the fray'd boy a thousand ugly signs,
Which riper judgment cannot shake aside:
And so the path of life is rough indeed,
And the poor fool feels double smart, compelled
To trudge it barefoot on the naked flint.
For what is judgment and the mind informed,
Your Christian armour, gospel-preparation,
But sandals for the feet, that tread with ease,
Nor feel those harsh asperities of life,
Which ignorance and superstition dread?
I much admire we ever should complain
That life is sharp and painful, when ourselves
Create the better half of all our woe.
Whom can he blame who shudders at the sight
Of his own candle, and foretels with grief
A winding-sheet? who starts at the red coal
Which bounces from his fire, and picks it up,
His hair on end, a coffin? spills his salt,
And dreads disaster? dreams of pleasant fields,
And smells a corpse? and ever shuns with care
The unpropitious hour to pare his nails?
Such fears but ill become a soul that thinks,
Let time bring forth what heavy plagues it will.
Who pain anticipates, that pain feels twice,
And often feels in vain. Yet, though I blame
The man who with too busy eye unfolds
The page of time, and reads his lot amiss,
I can applaud to see the smiling maid
With pretty superstition pluck a rose,
And lay it by till Christmas. I can look
With much complacency on all her arts
To know the future husband. Yes, ye fair,
I deem it good to take from years to come
A loan of happiness. We could not live,
Did we not hope to-morrow would produce
A better lot than we enjoy to-day
Hope is the dearest med'cine of the soul,
A sweet oblivious antidote, which heals
The better half of all the pains of life.—Hurdis.

Nothing gives so high a polish as truly religious feelings: they shrink into nothingness all those minor objects which create asperities between man and man: they give, from the habit of self-examination, an insight into the heart, a quickness of perception that knows every tender point, and avoids touching it, except to heal, whether its delicacy spring from the virtues, the infirmities, or even the vices of our nature. The Christian cannot be proud, vain, or negligent, except in the inverse of his religion: as the sun of righteousness shines out in his heart, these clouds melt away.

The courtesy of Christianity is equally visible in health and sickness, in retirement as in a crowd, in a cottage as in a palace. Those sudden gusts of adverse or prosperous fortune, so fatal to artificial pretensions, do not throw it off its guard. Like the finest porcelain of the East, when broken in a thousand pieces, every fracture displays new smoothness and polish; and, in its shivered state, it best shows the superiority of its beautiful structure, over those coarser kinds which are "of the earth, earthy."

The courtesy of Christianity is equally solicitous to avoid offending the poor and low, as the rich and great; recollecting that to the poor the Gospel was first preached, and that the Saviour of the world ennobled their situation, by choosing it for his own.——Mrs. Trench; *Thoughts of a Parent on Education.*

Of all the dispositions and habits which lead to political prosperity, religion and morality are indispensable supports. In vain would that man claim the tribute of patriotism, who would labour to subvert these great pillars of human happiness, these firmest props of the destinies of men and citizens. A volume could not trace all their connexions with private and public felicity. And let us with caution indulge the supposition, that morality can be maintained without religion; reason, and experience both forbid us to expect that national morality can prevail in exclusion of religious principle.—Washington.

THE MICROSCOPE.

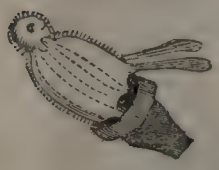
No IV.

IN several of the preceding volumes of the *Saturday Magazine*, we have given representations of many natural objects, which, when viewed under the microscope, have presented singular and beautiful appearances. In the present selection of objects we shall confine ourselves to an account of the organization of some of our common flowers, because they are the more easily referred to.

Fig. 1.

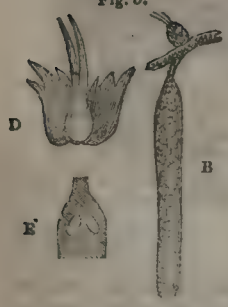
Fig 1, is a section of the blossom of the gooseberry. Between the petals or flower-leaves are the stamens, each consisting of a *filament* with an oval *anther* at the top, of a fine golden colour; the cup from which these grow is the *calyx*, in the centre of which are the *stigmæ*, and immediately under the cup is seen the *ovary* or seed-case, which forms the future gooseberry. All this beautiful arrangement of parts is for the purpose of perfecting that simple fruit.

Fig. 2.



The common wild heart's-ease, if the leaves are removed and the inner parts exposed, exhibits the appearance shown in fig 2.

Fig. 3.



The growth of a hazel-nut is well worth noticing. In the spring of the year many of the small branches are covered with two kinds of blossom, fig. 3; one kind is easily discovered, hanging like so many little yellow tails, shining beautifully in the sunbeams; these are called catkins, but it is not from these that the nut is produced. A closer inspection will enable you to discover near to the catkins, numerous small flower or rather fruit buds, of quite a different nature, consisting of a small group of scales, from the centre of which a number of very fine red filaments proceed. If we dissect this little bud, we find that these filaments are arranged in pairs, each pair being attached to an ovary or seed-vessel, containing two small seeds, one of which only comes to perfection. The left-hand figure B, is the catkin, D one pair of the filaments with the ovary, and surrounded by a small jagged calyx, containing, when partly grown, the two seeds as shown at E.

We should hardly expect so curious a structure as the following in plantain, broad leaved rib-grass, see fig. 4.

Fig. 4.

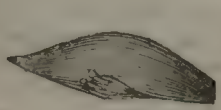
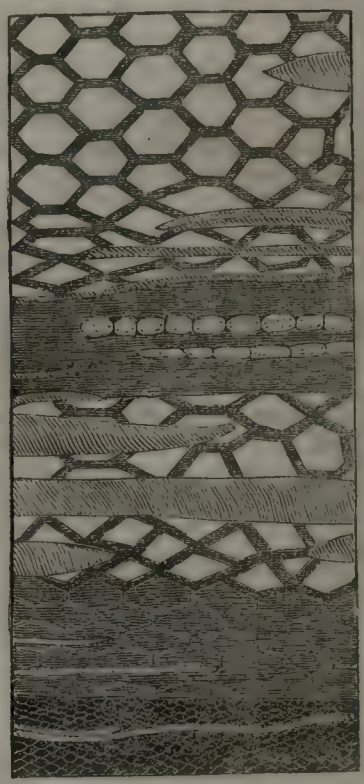


Fig. 5.

Fig. 6.

The flower of the duck-weed is placed in a most extraordinary situation, and many persons believe that it never flowers, but if it be attentively observed on a warm day in June or July, little straw-coloured specks will be discovered, and the leaf on which one of these specks is found, presents the appearance of fig. 5, when highly magnified; the flower being embodied in the substance of the leaf, and just protruding from a slit in its side. If this is carefully opened, the flower itself can be detached, and will appear like fig. 6. The blossoms and the stem of nearly all the grasses are worth noticing, and present to the view a very beautiful arrangement of parts.

We have already described that curious flower the vegetable fly-trap *, and the singular property of its leaves. The complicated construction of these leaves is most beautiful when seen under the microscope. In order to exhibit this arrangement, cut a very thin slice off one of its leaves through its entire thickness, and in the direction of its veins; place a portion of this in water under the microscope, and viewing it as a transparent object, it will present the following appearance.



In addition to the flowers of almost all plants forming beautiful subjects for the microscope, the seeds of many are well deserving of notice.

* See *Saturday Magazine*, Vol. I., p. 200.

I HAVE known what the enjoyments and advantages of this life are, and what the more refined pleasures which learning and intellectual power can bestow; and with all the experience that more than three-score years can give, I, now on the eve of my departure, declare to you, (and earnestly pray that you may hereafter live and act on the conviction,) that health is a great blessing,—competence obtained by honourable industry a great blessing,—and a great blessing it is to have kind, faithful, and loving friends and relatives; but, that the greatest of all blessings, as it is the most ennobling of all privileges, is to be indeed a Christian.—COLERIDGE.

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THE WYE AND MONMOUTHSHIRE. No. II.

CLIFFORD CASTLE, ON THE WYE.

ABBEY CWMHIR—LLANDRINDOD WELLS—BUILTH —LLYN SAVATHAN—ABEREDWY—GLASBURY— HAY—CLIFFORD CASTLE.

THE few fragments of the once magnificent *Abbey Cwmhir* that have escaped the ruthless hand of time, may be traced in a pleasant valley about seven miles north-east of Rhayadyr, on a verdant bank of the Clewedog. The situation of this venerable fane amidst lofty and beautiful hills is well calculated to inspire devotion. According to Leland, it was founded in 1143, for sixty Cistercian monks, but was never finished. There are a few specimens, (if we believe tradition,) still in good preservation, in Llanidloes church, consisting of six arches surrounded with small columns, ending in capitals of palm-leaves, which, according to a date on the roof, were brought from the abbey in 1542, which date corresponds with the final dissolution of monasteries in this kingdom. Leland says that the abbey was destroyed by Owen Glendower in 1401.

There are several barrows in this neighbourhood, and numerous carneddau, the most perfect of which is one on Camlow, near Abbey Cwmhir; and another on Gwastaden, a craggy wooded hill near Rhayadyr, is considered the largest in the county.

Llandegle, a pretty little village, celebrated for its medicinal waters, lies on the road from Rhavadyr to New Radnor, at no great distance from the former, and is well worthy of a visit, if it were only for the sake of its very lovely scenery. Mr. Roscoe tells us, that "a very singular range of rocks, abounding in beautiful quartz crystals, nearly joins the churchyard, and is much visited both for the views it commands, and the glittering treasures which may be won from the clefts and sides of the rock."

The Wye, after passing Rhayadyr, is considerably augmented by the waters of the Elian and Ithon; and Cwm Elian, the beauties of which have been celebrated by the Rev. W. Lisle Bowles, well merits the attention of the tourist. Mr. Roscoe calls this "the paradise of the district, created, like Hafod, out of bare and cultureless land." The name of Cwm Elian, is derived from the little torrent Elian, which runs through this singularly-romantic vale. Its waters join the Wye at Aber-dau-ddwr.

The Ithon, scarcely inferior to our peerless heroine the Wye, in scenes of picturesque beauty, joins the latter four miles above Builth, the *Bullæum Silurum* of the Romans. The scenery about *Pont ar Ithon* has been pronounced to be scarcely exceeded by any on the Wye above Ross. Pursuing the course of the Ithon upwards, we come to Llandrindod Wells, which are situated near the banks of the river, about four miles to the south of Penybont. When these

waters were first used for their medicinal virtues is uncertain, but it is generally believed that they were introduced to public notice towards the latter end of the seventeenth century. Since the year 1750, a great number of invalids have annually resorted here to partake of the waters, particularly within the last few years. Persons labouring under chronic diseases are said to receive considerable benefit from their use. In the neighbourhood are several Druidical and other remains worthy of inspection.

Returning from this digression, let us proceed onwards to Builth, distant from Rhayadyr about thirteen miles. The prevailing features of the scenery throughout this distance are extremely grand. The rocky channel of the river is confined by lofty banks till on its approach to Builth, when it expands into a bay with several naked rocks in its bed, and agreeable breaks. It is here joined by the waters of the river Yrfon, which fall into the Wye just above the town. This is a romantic stream, and in its vale is situated Llanwrytyd, where there is a medicinal well of much efficacy. At a bridge on the Yrfon, in the neighbourhood of Builth, Llewellyn ap Griffyth, the last of the reigning Welsh princes, was defeated by the English forces in 1282. Tradition informs us he was pursued and slain by his conquerors in a narrow dingle about three miles west of the town; the place, from this event was called Cwm Llewellyn.

BUILTH*, situated on the north-west extremity of Breconshire, has long been extolled for the salubrity of its air, and the picturesque beauty of its position on the banks of the Wye, in a broad and pleasant plain, embosomed by woods and mountains. The town is singularly built, having two parallel streets, which form irregular terraces on the side of a deep declivity. The streets are narrow, and the houses generally mean and squalid. A handsome stone bridge, erected in 1770, leads into Radnorshire. The remains of the castle are situated at the east end of the town, and comprise only a small portion of the wall facing the north. The site of the keep is about forty or fifty yards in circumference, surrounded by a ditch, and defended on the north side by two trenches. History has transmitted to us neither the name of its founder nor the period of its erection. The castle, originally of British origin, was probably afterwards rebuilt by the Bruces or Mortimers. In 1209 it was repaired and fortified by Gilbert, Earl of Gloucester; shortly afterwards it fell into the possession of Giles de Bruce, Bishop of Hereford; and after the defeat of Llewellyn, in 1282, became an English fortress. It was accidentally destroyed by fire, together with the greater part of the town, in the year 1690.

About a mile north-west from the town are some mineral springs, called Park Wells; there are three sorts of water, each strongly impregnated: viz., saline, sulphureous, and chalybeate. Pump-rooms and other accommodations are provided for visiters, who are often very numerous.

From a hill above Builth a good view may be obtained of *Llyn* (lake) *Savathan*, or *Brecon Meer*, which lies about three miles to the south-west of Brecknock. It is called by Giraldus, *Clamosum*, from the "terrible thundering noise it makes upon the breaking up of the ice in Winter." This lake is two miles broad, and about the same in length. Its depth is in some parts thirteen fathoms, and it abounds with various kinds of fish. Marianus calls this place *Bricenaic Meer*, from a castle which was reduced by Edelfleda in 913; but whether he means this or Blaen Lleweny Castle is uncertain. The country people have a very singular tradition, of a large city having been swallowed up by an earthquake, the waters of the lake afterwards covering the site. This, however, is probably mere fable, as there is no historical notice of such an event.

* Builth signifies according to H. Llwyd, Ox-cliff, or Oxen-holt.

In following the course of the Wye from Builth to Hay, the valley becomes contracted by high mountains on either side, and the road runs along the edge of the river, affording occasionally some charming prospects. A fine reach brings to our view the beautifully-retired village of Aberedwy, with its primitive church, and time-worn ivy-clad castle, situated at the junction of the Edwy with the Wye. This is unquestionably one of the most enchanting spots in the Principality. The Edwy descends for a considerable distance through a deep valley; but, for about half a mile before it joins the Wye, its channel is confined on either side by a lofty wall of rock, consisting of horizontal blocks of compact slate or flag-stone, in some places broken into crags, which overhang the abyss, and threaten the intruder who ventures beneath to view the sublime prospect they offer to his contemplation. Nothing certainly can exceed in grandeur and picturesque effect the scenery in every direction. Gilpin remarks,—

> It is possible, I think, the Wye may in this place be more beautiful than in any other part of its course. Between Ross and Chepstow, the grandeur and beauty of *its banks* are its chief praise; the river *itself* has no other merit than that of a winding surface of smooth water. But here, added to the same decoration from its banks, the Wye itself assumes a more beautiful character, pouring over shelving rocks, and forming itself into eddies and cascades, which a solemn parading stream through a flat channel cannot exhibit. The Wye also, in this part of its course, still receives further beauty from the woods which adorn its banks, and which the navigation of the river in its lower reaches forbids. Here the whole is perfectly rural and unincumbered: even a boat, I believe, is never seen beyond the Hay.

Aberedwy Castle is interesting to the antiquary, from having been the favourite residence, and latest retreat, of Llewellyn ap Griffyth, of whose fate we have previously spoken.

On Garth Hill, an inconsiderable elevation on the north side of the Wye, the vestiges of an ancient British camp may be traced. Erwood, on the opposite bank of the river, presents nothing worthy of notice, save that the tourist, if he expects comfortable accommodation, must wend his way elsewhere. Three miles from Erwood, stands Llangoed Castle, pleasantly embowered in woods, through the breaks of which, glimpses of the river may be obtained as far as Swaine. Near Llangoed is a magnificent dingle far from any thoroughfare.

The river near Boughwood Castle, makes the largest horse-shoe bend in its whole course. At Maeslough Castle, situate on an eminence above the village of Glasbury, an ancient seat of the Howarths, Gilpin speaks of the view as "wonderfully amusing." He says, the situation is, in its kind, perhaps, one of the finest in Wales. A lawn extends to the river, which encircles it with a curve, at the distance of half a mile. The banks are enriched with various objects, amongst which two bridges with winding roads, and the tower of Glasbury church surrounded by a wood, are conspicuous. A country equally enriched, stretches in the distance till the landscape is terminated by mountains. The bridge over the Wye at Glasbury, is remarkable, being constructed partly of wood, and partly of stone; it consists of several arches, and has a picturesque appearance.

From hence to Hay, a distance of about four miles, the scenery loses much of that grand and romantic character, which we have previously endeavoured to

describe, and becomes flat, and to a certain degree uninteresting; yet the Wye, when shorn of its bolder features, of its cataracts, rocks, and picturesque dingles, is ever lovely, and at almost every part of its course presents an inviting appearance.

Hay, or *Tregelli**, in the county of Brecon, is delightfully situate on the banks of the Wye, near its confluence with the Dulas, which separates Brecon from Herefordshire. It stands on the declivity of a hill, and consists of one main street divided into a fork near the middle. In 1794 Hay was deprived of its handsome stone bridge, by a tremendous flood, which entirely swept it away; at present a fine structure spans the stream. The remains of the ancient castle consist of a Gothic gateway covered with ivy, which frowns in venerable dignity upon the town beneath. A dwelling-house has been constructed out of part of the materials of the old edifice. The founder of the castle is uncertain; it has been ascribed to Sir Philip Walwyn, but afterwards being possessed by Maud de St. Valleri, tradition has attributed to her the building of the walls and castle. Leland, speaking of it in his time, says, "there is a castel, the which some time hath been righte stately." Hay, it would appear, was well known to the Romans, as coins have been frequently found; and some vestiges of a Roman fortress may be traced on a bank near the church. The church of St. Mary, a small plain building, romantically situated on an eminence almost precipitous on the north-west, close to the river, consists of a nave and chancel, with a tower at the west end, containing only one bell. A very ancient silver chalice, on which is engraven "Our Ladie of the Haia," is shown here. The view from the churchyard is very rich and diversified.

About two miles below Hay, on the east bank of the river, stand the "auncient ruins" of Clifford Castle, where once bloomed "Fair Rosamond," a daughter of one of the Earls of Clifford. She was celebrated in the chronicles of her time for her amour with Henry the Second, the story of which is well known. Dryden says her name was Jane Clifford, as the following lines testify:—

> Jane Clifford was her name, as books aver,
> Fair Rosamond was but her *nom de guerre*.

All writers concur in stating her to have been a girl of "peerlesse beautie," and of much sprightliness and wit. She died, it is supposed, at Woodstock, in 1177, and was buried in the Nunnery of Godstow. Some authors say that she was poisoned by Queen Eleanor in the Labyrinth at Woodstock, where she was confined by Henry; others, that she retired to Godstow, and there died. But the particulars of her melancholy history are involved in much obscurity. Camden says that the castle is recorded in Doomsday-book to have been originally built by Thomas Fitzosborne, Earl of Hereford. It afterwards came to Walter de Ponce, whose father Richard came over to England with William the Conqueror. Walter appears to have taken the name of Clifford, from this castle, and from him afterwards descended the Earls of Cumberland. The castle is seated on a commanding eminence, overlooking the Wye; and its ivy-mantled walls, surrounded by trees, form a highly picturesque object in a richly-wooded and well-cultivated country.

At Rhydspence, about a mile below Clifford, the Wye leaves Cambria, and turning in an easterly direction, enters the fertile plains of "Merrie England." Here we must pause.

* Signifying in Welsh, "the town among hazels."

SUMMER.

They may boast of the spring-time when flowers are the fairest,
And birds sing by thousands on every green tree;
They may call it the loveliest, the greenest, the rarest,
But the summer's the season that's dearest to me!

For the brightness of sunshine; the depth of the shadows;
The crystal of waters; the fulness of green;
And the rich flowery growth of the old pasture-meadows,
In the glory of summer can only be seen.

Oh, the joy of the green-wood! I love to be in it,
And list to the hum of the never-still bees;
And to hear the sweet voice of the old mother linnet,
Unto her young calling 'mong the leaves of the trees!

To see the red squirrel frisk hither and thither,
And the water-rat plunging about in his mirth;
And the thousand small lives that the warm summer weather
Calls forth to rejoice on the bountiful earth!

Then the mountains, how fair! to the blue vault of heaven
Towering up in the sunshine, and drinking the light,
While adown their deep chasm, all splintered and riven,
Fall the far gleaming cataracts, silvery white.

And where are the flowers that in beauty are glowing
In the gardens and fields of the young merry spring;
Like the mountain-side wilds of the yellow broom blowing,
And the old forest pride, the red wastes of the ling?

Then the garden, no longer 'tis leafless and chilly,
But warm with the sunshine, and bright with the sheen
Of rich flowers, the moss-rose and the bright tiger-lily,
Barbaric in pomp as an Ethiop queen.

Oh, the beautiful flowers, all colours combining,
The larkspur, the pink, and the sweet mignonette,
And the blue fleur-de-lis, in the warm sunlight shining,
As if grains of gold in its petals were set!

Yes; the summer,—the radiant summer's the fairest,
For green-woods and mountains, for meadows and bowers,
For waters, and fruits, and for blossoms the rarest,
And for bright shining butterflies, lovely as flowers.

Mary Howitt.

He that will allow exquisite and endless happiness to be but the possible consequence of a good life here, and the contrary state the possible reward of a bad one, must own himself to judge very much amiss, if he does not conclude that a virtuous life, with the certain expectation of everlasting bliss which may come, is to be preferred to a vicious one, with the fear of that dreadful state of misery, which it is very possible may overtake the guilty, or at best the terrible uncertain hope of annihilation. This is evidently so, though the virtuous life here had nothing but pain, and the vicious, continual pleasure; which yet is for the most part quite otherwise, and wicked men have not much the odds to brag of, even in their present possession: nay, all things rightly considered, have, I think, the worse part here. But when infinite happiness is put in one scale, against infinite misery in the other, if the worst that comes to the pious man, if he mistakes, be the best that the wicked attain to, if he be in the right, who can without madness run the venture? Who in his wits would choose to come within a possibility of infinite misery, which if he miss there is yet nothing to be got by that hazard? whereas, on the other side, the sober man ventures nothing against infinite happiness to be got, if his expectation comes to pass. If the good man be in the right, he is eternally happy; if he mistakes, he is not miserable, he feels nothing. On the other side, if the wicked be in the right, he is not happy; if he mistakes, he is infinitely miserable. Must it not be a most manifest wrong judgment that does not presently see to which side in this case the preference is to be given.—Locke.

No entertainment is so cheap as reading, nor any pleasure so lasting.—Lady M. W. Montague.

We are led to the belief of a future state, not only by the weaknesses, by the hopes and fears of human nature, but by the noblest and best principles which belong to it, by the love of virtue, and by the abhorrence of vice and injustice.—Adam Smith.

CHAPTERS ON CORONATIONS.

No IV.

CORONATION VESTMENTS.

IN this chapter we shall describe the garments of state with which the sovereigns of England are invested by the archbishop of Canterbury and his assistants during the ceremony of the coronation. The chief of these, the IMPERIAL PALL, called also the Dalmatica, Mantle, or Open Pall, was at one

THE IMPERIAL MANTLE, OR PALL OF STATE.

period richly embroidered with golden eagles, but having been destroyed, with the rest of the Regalia, in the time of the Commonwealth, a very rich gold and purple brocaded tissue is used in its stead, encircled with gold and silver trails, and large flowers of gold frosted. All the ornaments are edged round with purple, or a deep mazarine blue. The pall was originally part of the imperial habit, being a rich robe of state, reaching quite to the ground. It is said that Constantine the Great granted the use of this vest to the bishops of Rome, and that the same honour was subsequently granted to other patriarchs by his successors. The pall at length became the badge of episcopal dignity, and hence, when prelates were deprived of their sees, or quitted them voluntarily, they resigned their palls to the emperors. When the popes first assumed the power of granting this honorary badge, which they did previous to the pontificate of Gregory the Great, A.D. 590, they did not presume to do so without the permission of the emperor; but in process of time they usurped the privilege of conferring it according to their pleasure, and raised exorbitant sums from all the prelates of Europe, whom they compelled to purchase this ensign of dignity. They also made a canon, enacting, that a metropolitan, until he have received the pall, cannot consecrate bishops or churches, or receive the archiepiscopal title; and they compelled archbishops to purchase a new pall on every translation. Tertullian informs us, that the pallium, or pall, was assumed as a dress by the Christians, to distinguish them from the heathens, who used the toga. The pall is used at the coronation of monarchs, because they are supposed by this ceremony to be invested with a sacred as well as a civil character. The name Dalmatica, is derived from an ancient clerical habit, so called because it was previously the ordinary dress of the people of Dalmatia. It covered the whole body, and had large loose sleeves; on which account it was thought to be convenient for the ministry of deacons. But it was also worn by bishops, as we learn from the acts of St. Cyprian, the celebrated martyr of the third century, who being about to suffer death, delivered his dalmatic to his deacon, leaving the rest of his dress to his executioners. At present the proper dalmatic forms part of the under-dress of Romish bishops, when they officiate pontifically, being made of thin light silk. But as the outer and distinctive vestment of their deacons, it is richly embroidered, and has a sort of large open wings attached to it, as substitutes for sleeves.

SUPER-TUNICA, OR SURCOAT.

The SUPER-TUNICA, Surcoat, or Close Pall, which is worn under the imperial pall, is a straight coat with plain sleeves, of a thick and rich cloth of gold tissue, ornamented with gold flowers, brocaded and frosted, without either silk or velvet. The length behind is about four feet, and in front a yard and a quarter, having only one division, which forms it into two skirts, each skirt being a yard and a half, so that the whole width at the lower part is about three yards. To this belongs a belt, or girdle, made of the same cloth of tissue, lined with a white watered tabby, having a gold buckle and clasp, to which hangers are affixed for the sword with which the sovereign is girded.

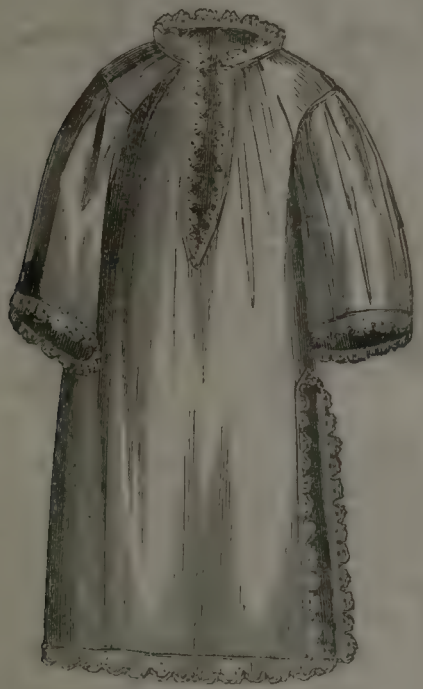
The ARMILLA, or Armil, should properly be called the Stole, and should always be connected with the Surcoat; but, by some strange and inveterate error in the ceremonial of English coronations, it has received the name properly belonging to the bracelets, and takes their place in the form of investiture. It is made of the same cloth of tissue as the Super-Tunica, and is lined with common sarcenet. The length of it is about an ell, and the breadth three inches; it has two double ribands at each end, of crimson taffeta, viz., two at the corners of the end, to tie it below the

THE ARMILLA

elbows, and two a little higher, for tying it above them. The Stole, as this garment should properly be called, is strictly an ecclesiastical garment, and must always be worn by the Romish priests when celebrating mass. In Flanders and Italy the priests also wear it when preaching. Hence Sir Walter Scott introduces Robert Bruce promising the Lord of Lorn,

> My first and dearest task achieved,
> Fair Scotland from its thrall relieved,
> Shall many a priest in cope and stole,
> Sing requiem for Red Comyn's soul.

The COLOBIUM SINDONIS, or Surplice, is the last garment put upon the sovereign after the anointing; it is made of very white cambric, and is rather longer than the Super-Tunica; it is laced about the neck, round the arm-holes, or openings of the shoulders, down the breast, up the slits of the sides, and round the lower edge, with the finest Flanders lace, ruffled on very full. Both its names signify short linen garments, and Sindonis is sometimes used to denote the shroud for wrapping the dead.



THE COLOBIUM SINDONIS.

The ornaments already mentioned are for the most part clerical, but there is a second surcoat purely secular. It is made of crimson satin, and is lined with sarcenet of the same colour. In form and dimensions it is nearly the same as the Super-Tunica.

BUSKINS.

The *Buskins* are made of the same cloth of tissue as the Super-Tunica, and lined with crimson sarcenet; the height of them is eighteen inches, the compass at the top fifteen inches, and the length, from the heel to the toe, is eleven inches and a quarter. The *Sandals* are made with a dark-coloured leather sole, and a wooden heel covered with red leather. There are three bands, two of which go over the foot, and the third behind the heel; they are made of cloth of tissue, lined with crimson taffeta, as is likewise the lining of the sole. The length of the sandal is ten inches. These portions of the royal dress are derived from the *Cothurni purpurei*, or purple buskins, which were a distinguishing cognizance of the Byzantine emperors.

SANDALS.

The sovereign's ROBES OF ESTATE consist of a Surcoat of purple velvet, and a large mantle of the same, furred with ermine, lined with sarcenet, and bordered with gold lace. The parliament robes are similar in form, but are made of crimson velvet.

Peers of all ranks attend in their robes of estate, which are the same as their parliament robes, that is, crimson velvet mantles, furred with rows of ermine proportioned to their degree; a duke's has four rows, a marquis's three and a half, an earl's three, a viscount's two and a half, and a baron's two

The distinctions of rank among the peeresses are marked by the length of their trains; a baroness may have a train of three feet on the ground, a viscountess a yard and a quarter, a countess a yard and a half, a marchioness a yard and three-quarters, and a duchess two yards. The following directions for the dresses of peeresses were issued by the Earl Marshal, by whose orders all robes are regulated, previous to the coronation of George the Second.

The surcoats, or mantles, to be all of crimson velvet, close bodied, and clasped before, edged or bordered with minever pure, two inches broad, and scolloped down the sides from below the girdle, and sloped away into a train proportionable to the length of the robe or mantle for each degree; viz., about a third part thereof; the sleeves of the surcoats also to be of crimson velvet, about five inches deep, scolloped at the bottom, edged with minever pure, and fringed with gold or silver.

The caps of their coronets to be all of crimson velvet, turned up with ermine, with a button and tassel of gold or silver on the top, suitable to the fringe of their sleeves.

The petticoats to be of cloth of silver or any other white stuff, either laced or embroidered, according to each person's fancy.

The mantles to hang back, being fastened on each shoulder with cordons of silver or gold, suitable to their fringe, with tassels of the same, hanging down on each side of the waist.

The surcoats, or kirtles, to open before, that the petticoats may appear.

Knights of the different British orders not being peers, usually wear the full-dress habits of their respective orders. Knights who are peers wear only the collar of their order over their velvet mantles.

The dresses of the kings at arms, heralds, and pursuivants, add considerable splendour to the ceremonial of a coronation. The kings at arms wear tabards, or surcoats of velvet and cloth of gold, on which the royal insignia are emblazoned; these tabards resemble sleeveless gowns in form, but they are furnished with wings, which fold over the arms. They wear also collars of SS, that is, composed of links shaped like the letter S, made of silver gilt, with badges at the centre, containing the shamrock, rose, and thistle, enamelled in their proper colours. They are also entitled to wear coronets, or plain circles of gold, decorated with sixteen upright leaves, eight of which are long, and eight short. The words, "Miserere mei Deus," that is, "Have mercy upon me, O God," are enamelled round the circle. Within

it is a crimson velvet cap, turned up with ermine, and surmounted with a tuft and tassel of gold. So important was the office of king at arms anciently held, that a solemn ceremony was appointed for their inauguration. In fact, it was the mimicry of a royal coronation, except that the unction was performed with wine instead of oil. In Scotland, Sir David Lindesay was crowned Lyon king of arms by his sovereign, with the ancient crown which the monarchs wore before they assumed a close crown, A. D. 1592. So sacred was this heraldic office held, that, in 1515, Lord Drummond was by parliament declared guilty of treason, and his lands forfeited, because he had struck with his fist the Lyon king at arms, when he reproved him for his follies. Nor was he restored but at the Lyon's earnest solicitation.

The tabards of the heralds are made of crimson damask; they wear plain silver collars with badges similar to those of the kings at arms. The pursuivants wear tabards of satin.

Two persons were usually appointed to represent the Dukes of Aquitaine and Normandy; they wore robes of estate of crimson velvet, lined with white sarcenet, with deep capes and broad facings, all richly powdered with ermine, and with hats or caps of estate of crimson and gold paduasoy, furred with ermine.

The barons of the Cinque Ports, who support the canopy over the sovereign, are all habited alike; they wear doublets of crimson satin, scarlet hose, scarlet gowns, lined with crimson satin, black velvet caps fastened on their sleeves, and black velvet shoes.

The gentlemen pensioners, who guard the canopy, wear coats of scarlet cloth, richly laced with gold, and black hats wreathed round with feathers; they carry gilt axes in their hands, and are preceded by the clerk of the cheque in the same habit.

The ancient coronation robes which were destroyed in 1649, do not appear to have been very valuable, if we may judge from the enumeration given of them by the parliamentary commissioners, from which we have before quoted. In their report we find the following "Inventory of the Regalia, now in Westminster Abbey, in an iron chest," where they were formerly kept:

	£	s.	d.
One common taffaty robe, very old, valued at	0	10	0
One robe laced with gould lace, valued at	0	10	0
One silver cullered silk robe, very old and worth nothing	0	0	0
One robe of crimson taffaty sarcenet, valued at	0	5	0
One paire of buskins, cloth of silver and silver stockings, very old and valued at	0	2	6
One paire of shoes of cloth of gold, at	0	2	0
One paire of gloves, embroidered with gould, at	0	1	0
Three swords with scabbards of cloth of gould, at	3	0	0
One old comb of horne, worth nothing	0	0	0
Totall in the chest	4	10	6

The comb, which is here dismissed so contemptuously, was supposed to have belonged to Edward the Confessor, and was used in the ancient forms of coronation, to smooth the king's hair previous to the anointing.

No special coronation robes are provided for a queen consort, but those used by a sovereign queen do not differ in any essential particular from those employed at the coronation of a king. Clerical and legal dignitaries wear their ordinary robes of state, and all military officers appear in their full-dress uniform. The earl marshal usually issues a proclamation forbidding any of the spectators to appear in mourning, and persons who occupy front seats are generally expected, if not required, to come in full court-dress.

ON THE LANGUAGE OF ANIMALS.

No. I.

THE language of animals has at all times been a favourite subject of speculation; but this has been limited to poetry and fiction. No rational inquiry has yet been made respecting the possibility of what appears incapable of proof. We have reason to expect it; and we have no right to decide against it, if it can be shown that our faculties and observations are incompetent to discover what the fact is. Thus far the balance is, at the very least, in suspense; and it should turn decidedly in favour of such a conclusion, if we can find, in animals, actions which could not be conducted without language; still more if we can trace variety of sounds, and those accompanied by peculiar actions, though we should be unable to analyze them, and give their definite applications.

On the subject of hearing, as being fundamental on this question, we are accustomed, not unnaturally, to give more credit to our own senses than they deserve. We decide on their perfection by an estimate drawn from themselves; which is as if he who is without ear for music should dispute the existence of refined harmonies. Even in the musical scale, which forms the most audible collection of discriminate sounds, there are tones at each extremity, which we cannot distinguish, as at length there are also notes that we do not hear. We know that they exist, from the visible vibrations and the measures of strings; but the ear has ceased to discern them. The snoring of a dormouse is so acute that the note cannot be assigned, as it is also on the very verge of inaudibility. In a string or an organ pipe, it is easy to produce indiscriminable, and even inaudible tones, at the opposite extremity of the scale.

If now we take sounds that are not in the diatonic or chromatic scale, the difficulty of distinguishing them augments rapidly as the ratios approach nearer to each other, till at length, to imperfect ears, dissimilar ones appear the same. This is the case, even if those sounds are single, or truly musical, belonging to fixed divisions of the scale; but if at all vacillating, as are the sounds of speech, there is no human ear that can follow and distinguish them, however widely sundered they may be. Our ears are not calculated for such distinctions: in many persons, they cannot distinguish even among neighbouring enharmonic tones, except in the case of a chord, where there is a fixed and known note of reference, or in that of a false unison. Hence it is probable, that however music may continue to improve under the increase of enharmonic chords, we shall never produce enharmonic melodies, because unintelligible to our organizations.

Yet such melody is intelligible to the birds which produce it; since it is produced, definitely and intentionally, under finer organizations of the musical instrument, and of the sense of hearing. Thence may it be inferred that these, and other animals also, may both hear and discriminate those unsteady sounds produced by themselves which should constitute their own language, although we cannot; while to assume that they do not, is plainly to measure their faculties by our own defective ones.

It is not less true that we have been accustomed to decide against the sensibility of these animals on false grounds, and under an ignorance of the very nature of music. We dispute it, because they do not produce and enjoy that which we term music; a succession and consonance of intervals in the diatonic and chromatic scale. But while this is the produce of

an arbitrary law of nature, rendering that class of sounds pleasing, it is evident that instead of proving the high sensibility of our own ears, it is a proof of the exact reverse; since these pleasing sounds demand little effort of discrimination, from the distances of their ratios. Hence should the sensibility to sounds, in the birds at least, far exceed our own; since their power, with their pleasure, consists in producing intervals more minute, and thence demanding finer senses, that they may delight in what was appointed for them, as our own less refined ones were for us. That they hear and understand what they produce, is evident, since otherwise it could not be executed.

In the nightingale and thrush, we distinguish a great number of sounds and articulations, because they belong, or approach, to that musical scale for which our sense of hearing is adapted. But we cannot doubt, that in these, and still more in birds whose tones are less musical and definite, there are sounds which we do not truly distinguish, and which we therefore neglect in favour of those to which we are most sensible. And there is no difficulty in believing that the song of a nightingale is better understood by itself than by us, or that it contains much more than we hear. If I were to suggest that it contains a definite set of phrases, with meaning, to the animal itself and its kind, there would be nothing absurd in the proposition; since it possesses, even to our ears, a greater variety of articulation than we can find in any language with which we are unacquainted: while, in confirmation of this general view, all who have attended to such subjects must know, that where these birds abound, long debates are often carried on among them, in tones and articulations quite distinct from the ordinary songs. When we decide otherwise, we are deciding from a prejudice, or assuming that it is not a language, because we do not understand it. We should be equally justified in thus deciding as to the Arabic.

But there is another circumstance relating to sound, which may concern this question. This is the quality, or timbre. We distinguish this readily, in the several musical instruments; and even in the different qualities of human voices, which depend on this mysterious property of sonorous bodies. It requires far nicer ears to perceive the minute differences in the qualities of two instruments of the same kind, which are still differences of timbre: and if the ordinary ears which distinguish among singing-birds do this chiefly through the melodies, a finer one is fully sensible of the difference of timbre among many of them. And thus we may grant a still finer perception of this kind to animals of nicer sensibilities: of which indeed we have a proof in the fact, that the wild birds and the domestic fowls recognise the voices of their own partners and offspring, and that even the sheep knows the bleat of its own lamb. Thus can we grant again, that animals may possess means of discrimination for the purpose of language, where we can distinguish nothing.

The human language, to those unacquainted with it, presents nothing but noises, or sounds, which we can scarcely perceive to be articulate ones. If not rigidly true of the European languages derived from a common root, of which we are familiar with one branch, it is notorious in that of a Greenlander or a Hottentot, or in that of the Celtic dialects of our own country. Not to speak ludicrously on a grave subject, the objurgations of an assembled multitude of Welsh do not exceed, in articulate and discriminate sounds, the noise of a rookery. We happen to know that there is language but our ears do not give us that information.

When we have learned the meaning of those sounds, we can also discriminate them, but not tell them: not even, easily, except under that slow and distinct articulation which allows us to study each. Thus, if animals have been taught by the Creator such languages as are necessary for their wants, since more cannot be expected, it is plain that they may perfectly understand each other, or be expressing even numerous and definite ideas, where we perceive nothing but noise, and probably never shall.

There are valid reasons in the necessity of the case, and in the general conduct of the Creator, why animals ought to possess language. There is, or may be, language accompanying the means of language, for aught that we can decide to the contrary: so that the question remains suspended between a high probability, and an ignorance which has nothing to oppose. In evidence of this probability, a very few positive facts out of many may be selected.

Communication is peculiarly necessary among the gregarious and social animals; and we accordingly see that many of those do act together under peculiar sounds. Let us not, however, be misled by the term language, since it is in terms that our difficulties often lie. The communications of animals are not the language of the fabulists. The range of their ideas is limited, and so must be the modes of their expression. And, as a natural language, or a gift to those which are incapable of educating each other, it is probably fixed, or incapable of extension: though there are reasons for believing, that where educated by us, they increase its range. But if this inquiry is limited to a language of sounds, it must not be forgotten that the social animals do understand each other, as some different kinds also probably do, by means of some physiognomic or pantomimic signs, equally taught by nature.

Familiar examples of various and vocal language exist in the duck tribe, followed by correspondent actions, in marshalling their flights, and in much more. The sounds and articulations of the domestic duck and goose in particular, are so numerous and marked, that they are not equalled by any human language; while it is not difficult to learn the definite, if the general, meaning of many of them. It is not easy to see how else the decoy duck can perform its treacherous office. It is the same notedly with the hog: while if we see the effects in many of the proceedings of this animal in society, I need only note, that thus it will collect its companions to ravage a field, as the dog conducts its own to the chase, and as the rat and the mouse assemble and lead their tribes to a discovery of food. If we do not know that the beaver has similar means of communication, we cannot comprehend the possibility of its conduct in society without some language. In the endeavours of birds to persuade their progeny to fly and to dive, we can scarcely avoid believing that we hear a definite language; so unusual, and varied, and marked, are the articulations and the tones. The quarrels of sparrows are more articulate, and the noises more varied, than those of a human contest. The sounds of a domestic fowl under the approach of a hawk, the intention to sit, the calling its young to feed, and much more, equally familiar, are not less various and definite. However disagreeable the sounds of the cat may be to us, they abound in variety of expression: and in the rook, the comparison of actions and sounds renders it scarcely possible to avoid concluding that the latter constitute a language. The destruction of a rook's nest, occasionally proceeding to the slaughter of the animal, is preceded by a congregation of the society, and a great noise; as all

know that the work is executed by the deputation of two or three individuals out of this convention.

Not only the necessity, but the certainty of communication in the gregarious insects has been shown: especially in bees and ants. Huber has thought that he could prove a language of signals, through the antennæ. Some insects can produce sounds, independently of the vibration of their wings, by friction. If these are audible to us, there may also be similar inaudible ones, sufficient possibly for many purposes: while it is not impossible that one or more of their tracheæ may be provided with the means of sound.

[Abridged from MACCULLOCH's *Proofs and Illustrations of the Attributes of God.*]

THE SAGO PALM, (*Sagus raphia.*)

THE Sago of commerce is the product of a species of palm which grows naturally in various parts of India and Africa. It is one of the most common, and at the same time one of the most useful of the vegetable productions of the countries in which it is found. The central vein or rib of its ample leaves is used by the natives of Africa for various useful purposes; they form it into weapons of offence, and they employ it for the purpose of capturing fish: for this purpose a species of fish-hook, resembling the barb of a harpoon, is fixed to one end, to the other a line is fastened, which is afterwards passed round the body of the sportsman. Thus armed, he wanders along the sea-shore, and on the banks of the river, and whenever he perceives a fish, throws his dart, and generally with success. His prey is allowed to remain for some time, without an attempt on his part to draw it out of the water, until it is sufficiently exhausted by its efforts and by loss of blood.

Of the perfect leaves the Indians form fences to their fields, coverings to their houses, and when properly fastened together by means of branches of trees, the dwellings themselves; these habitations are much more durable than could be expected, on account of the great strength and thickness of these bundles of leaves.

The natives of Africa obtain a liquor from this tree, which much resembles palm wine, but is stronger and of a deeper colour. They have two methods of extracting this liquor; the first consists in collecting the sap in calabashes, from incisions made in the fleshy substance of the summit of the tree from which the new leaves proceed. The second plan is to collect a quantity of the fruit, to strip it of its rind, and steeping the kernels in the sap already noticed, diluted with water, to allow the whole to ferment. This second kind of wine is still higher coloured, and more intoxicating; it sparkles like champagne, and can be kept a considerable time.

The production for which this tree is best known in Europe is sago, although other trees of the palm tribe also yield it in greater or less quantities. The sago is principally extracted from the pith which fills the trunk of the palm, and is of a more delicate colour and nature in the young than in the old trees.

The trunk of the tree being split in the direction of its length, the operator removes the pith which he breaks in pieces, and throws into a vessel made from the bark of a tree, and placed over a horse-hair sieve; he then pours water over the mass and the finer parts of the pith pass through the sieve, and are received in pots which are provided for the purpose; the fibrous portions of the pith are retained by the sieve.

The liquid thus obtained is, in the first instance, turbid, from the quantity of matter it holds in solution; this, by degrees, settles to the bottom of the vessel, and the clear liquor is drawn off. The mass that remains is then passed repeatedly through shallow dishes of metal perforated with numerous small holes; this is continued until it is sufficiently dry to prevent the grains into which it is formed by the process, from again becoming united. The reddish tinge which is observed in the Sago of commerce, arises from the effect of the heat to which it is submitted to render it perfectly dry.

In the Moluccas and the Philippine Islands, the soft paste of the sago, before it is dried, is formed into cakes about six inches square and of the thickness of the finger. These are strung together in bunches of ten and twenty and exposed for sale; it is also employed in the making of puddings, gruel, and for the same culinary purposes to which wheaten flour is applied in this country.

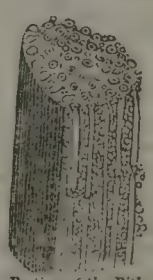
The Sago Palm is a tree of moderate height, seldom attaining to twenty feet. The fruit, which is a dry oval cone covered with small scales, grows in clusters, forming a large oval tuft or bunch.

There is a palm-tree closely allied to the Sago Palm, which grows in great abundance in South America, in the neighbourhood of the Oronoko; to this tree a native tribe, the Guarinis, are indebted for nearly the whole of their subsistence; and thus, says Humboldt, "we find in the lowest stage of human civilization, the existence of a people depending entirely on a single species of tree, in the same manner as some insects are confined to certain parts of a flower." The Guarinis also form their habitations, if they deserve that name, from the leaves of this tree, they make mats from the fibres of its leaves, and during the rainy season, when their country is under water, they live on the summit of the trees. The mats they form are suspended from tree to tree, and covered on the upper side with clay. On these moist couches the women light the fires necessary for their cookery, and the traveller, who during the night is floating down the stream of the river, sees lights, as it were, suspended in the air at a considerable elevation.

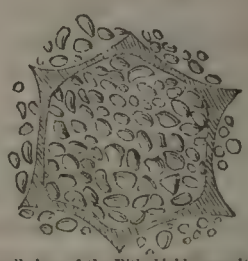
In addition to the nourishment derived from the pith of this tree, a wholesome repast is furnished by the kernels of the fruit when ripe.

Cone of the Fruit. *A Kernel, natural size.*

FRUIT &c., OF THE SAGO PALM.



Portion of the Pith.



Small piece of the Pith, highly magnified.

JEREMY TAYLOR is an excellent author for a young man to study, for the purpose of imbibing noble principles, and at the same time of learning to exercise caution and thought in detecting his numerous errors.—COLERIDGE.

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THE

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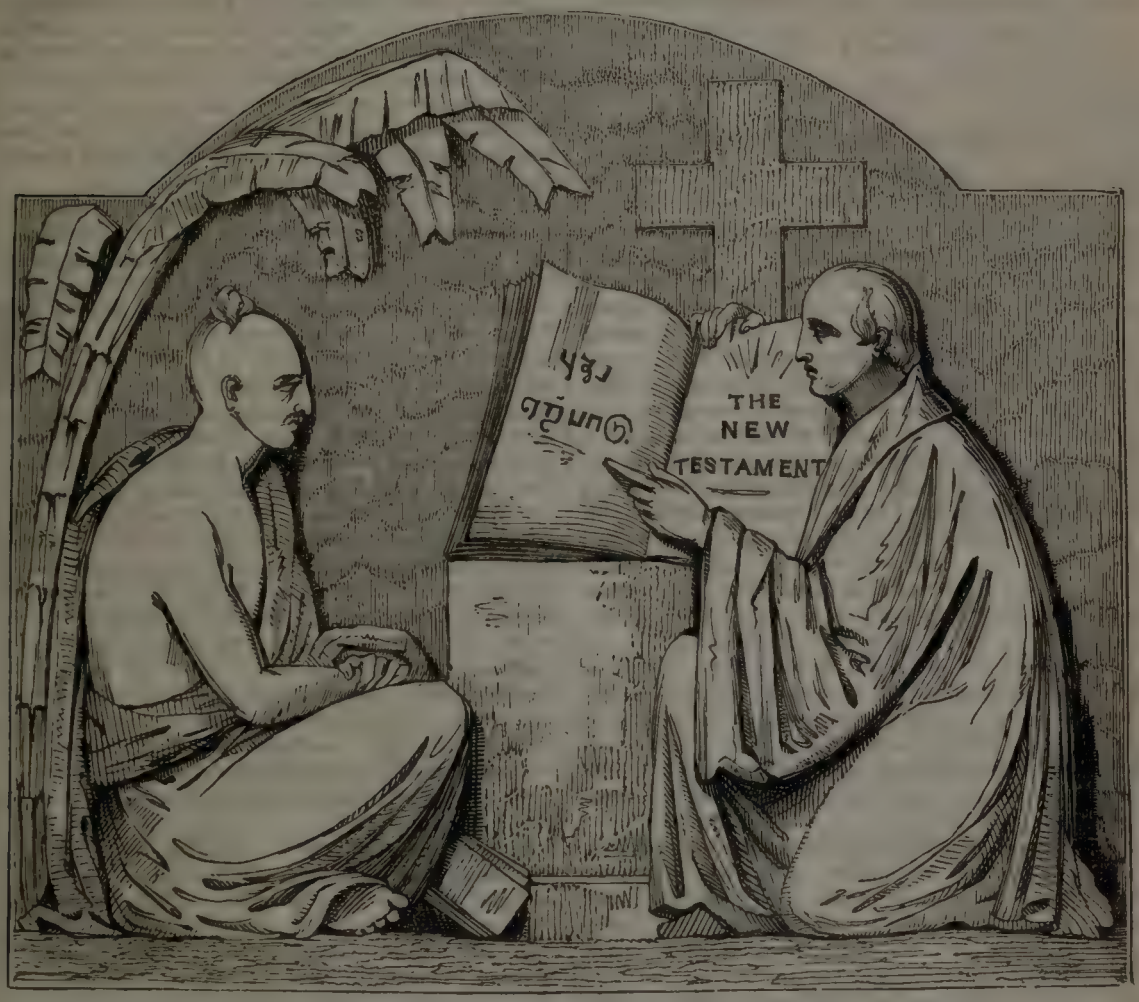
No. 389. JULY 28TH, 1838. { PRICE ONE PENNY.

JOHN PETER ROTTLER, THE MISSIONARY.



SACRED to the Memory of the Reverend JOHN PETER ROTTLER, P.D., Missionary, who fell asleep in Jesus,
On Sunday morning, January 24th, 1836, aged eighty-six years, and seven months.

This venerable servant of GOD, having, for the cause of CHRIST, left his country, kindred, and father's house in Germany,
Laboured as a devoted Missionary in India for above sixty years,
Formerly in the service of the Royal Danish Mission at Tranquebar,
And latterly at Vepery, in the service of the Society for Promoting Christian Knowledge.
He was also for several years Chaplain to the Madras Female Orphan Asylum.

As a testimony of reverence for the memory of this excellent man, and as an acknowledgment
Of the mercy, faithfulness, and grace of God, exhibited in his life, labours, and death,
THIS TABLET IS ERECTED,
By the united subscriptions of European, East Indian, and Native Christians.

Be not slothful, but followers of them who through faith and patience inherit the promises.—HEB. vi. 12.
The harvest truly is plenteous, but the labourers are few: pray ye therefore the Lord of the harvest, that he will send forth labourers into his harvest.—MATT. ix. 37, 38.

ABOVE is the representation of a monumental tablet to the memory of the Rev. Dr. Rottler, which has been executed by Mr. R. Westmacott, Jun., and lately forwarded to India, to be erected in the Mission Church at Vepery, Madras.

The subject itself, of a Protestant clergyman unfolding the pages of the Gospel to an uninformed but attentive heathen, and explaining to him "in his own tongue, wherein he was born*, the wonderful works of God," would be interesting to the Christian reader, even without the epitaph which accompanies the plate; but the brief sketch of this

* The words *in Tamil*, on the left page of the book, signify, THE NEW TESTAMENT.

good man's life, which is here given in simple and appropriate language, has induced us to inquire further into the particulars of his history. Bishop Heber speaks of him in his *Journal* in terms of affection and respect, as "good old Dr. Rottler;" and writing to Mrs. Heber in 1826, he says, "I am greatly impressed with reverence for the worthy old missionary, Dr. Rottler." At a later period, (February, 1835,) in a charge delivered by the present Bishop of Calcutta, to the reverend Missionaries at Vepery, his lordship alludes to Rottler, as "one of the three honoured Missionaries who have laboured for fifty years or more in the fields where Ziegenbalg and Swartz, Gericke and Pohlé, Jœnicke and Haubroe, had laboured before them, and who still survive to bless us with their advice and their prayers."

This excellent and learned person was born at Strasburg, in June, 1749, where he received his early education, which was continued at Copenhagen: he was admitted a candidate for ordination from the latter place, by the bishop of Zealand, in 1775. He embarked for India when ordained, arrived early in the year 1776, in the service of the Royal Danish Mission*, at Tranquebar, and there laboured faithfully for many years. In the year 1803, he was nominated by the brethren at Tranquebar, to assist in the superintendence of the Vepery mission, in consequence of an application made to them on the removal to Calcutta of Mr. Pœzold, and the death of Gericke, which had left the station without a missionary.

The connexion thus formed did not extend beyond the year 1807; Mr. Pœzold having resumed his labours at Vepery: and Dr. Rottler remained at Madras, as Secretary and Chaplain to the Female Orphan Asylum, the duties of which appointment he conscientiously discharged for many years. The death of Mr. Pœzold brought him once more, towards the close of 1817, into the service of the SOCIETY FOR PROMOTING CHRISTIAN KNOWLEDGE, and from that time until the day of his death, he continued a missionary in its employ at Vepery, frequently preaching in Tamil to the native congregations, and giving satisfactory proof of his ministerial zeal and usefulness. In 1833, the SOCIETY, in consideration of his valuable services, and also of his advanced age, allowed him a pension to the full amount of his stipend. He died on the 24th of January, 1836, in his eighty-seventh year. The Rev. C. Calthrop wrote as follows:—

His venerable remains (attended by the Archdeacon and clergy at Madras, and a great number of Europeans, East Indians, and natives), were interred in the Vepery Mission churchyard, on Sunday evening, the 31st of January; I reading our solemn funeral service in English, and my brother Missionary, Mr. Cæmmerer, in Tamil. Through the kind offer of the Rev. Mr. Cubitt, I addressed the English congregation in the evening, from 2 Kings ii. 11th and part of 12th verses. May God own and bless what was prepared in much haste and confusion, and delivered in much weakness and sorrow! Such a funeral I never before witnessed,—so solemn and affecting. From the feelings and tears which were manifested, I trust it may be long, yea, ever remembered by us.

The loss of this truly primitive Christian minister seems to mark an epoch in the history of the Protestant Mission in the south of India: for the long period of his faithful labours connect him with the earliest days of Christian knowledge in that country, and with the planting of many churches by the apostolic Swartz, and his contemporaries, under the blessing of Him to whose glory they were devoted. Rottler was twenty-two years a labourer in the same vineyard with Swartz, and survived him thirty-eight years. For the last twenty years he bore a prominent part in all the measures adopted for the improvement of the mission in Southern India, first under the Society for Promoting Christian Knowledge, and afterwards, on its transfer to the superintendence of the Society for the Propagation of the Gospel in Foreign Parts. In his latter days, he witnessed the erection of the new mission church at Vepery†, (the chief station in the neighbourhood of Madras,) the enlargement of the school, and the establishment of a seminary for training native youth to the duties of Catechists, and eventually for the sacred office of Missionaries. In all these works he zealously co-operated with the local committees, and with his brother missionaries; giving them the benefit of his counsels and experience, when his infirmities had diminished the powers of bodily exertion.

Among the most essential benefits he conferred on the mission in his private hours, were a revision of Fabricius's *Translation of the Old Testament*, and the preparation of a Tamil version of the Liturgy of the Church of England, now in general use throughout the congregations in union with the Church of England in Southern India, and also, it is believed, in those holding communion with the Wesleyan Methodists: he was likewise engaged to the last days of his valuable life in compiling a *Tamil and English Dictionary*, now in the press, to which he had devoted a certain portion of his time for twenty years.

In the earlier seasons of his residence in India, he pursued in his leisure hours the study of Botany: in which science he attained to great eminence. Having been in communication with the most eminent botanists in Europe, he received in acknowledgment of his high attainments, the diploma of a doctor of physical sciences, from the University of Vienna. He bequeathed to the Vepery mission his valuable Herbarium‡, his books and manuscripts, together with the contingent reversion of some other property.

In his public and private character no one could be more deservedly loved and respected. During a long period, he persevered in his holy calling, while heavily afflicted with sickness. For the last ten years of his life in India he was a constant sufferer, seeking his recreation in the most becoming and innocent pursuits, and in the end was brought to his heavenly rest in peace. A worthy associate of Swartz and Gericke! the last but one or two of those holy men, who were the privileged few, in early years, to have had committed to them amongst the heathen, in a land of darkness, the ministry of reconciliation through Christ.

The project for erecting this tablet originated with the Madras Diocesan Committee of the Society for Promoting Christian Knowledge, they having communicated with the reverend Missionaries on the subject, and appointed a Committee in England, who exerted themselves in procuring additional subscriptions. It was also proposed to apply the surplus, had there been any, to founding scholarships in the Vepery Mission School, to be designated "Rottler's Scholarships." This latter object, however, we understand, has not been attained, the amount collected proving sufficient only for carrying the original design of a tablet into effect.

* As early as the year 1710, the Society for Promoting Christian Knowledge assisted in the support and enlargement of the Protestant Mission, then maintained by the King of Denmark at Tranquebar, for the conversion of the heathen.

† "At Vepery is the finest Gothic church, and the best establishment of *native schools*, both male and female, which I have yet seen in India."—BISHOP HEBER'S *Journal in India*.

‡ The *Herbarium* has been sent to England by the executors of Dr. Rottler, and placed at the disposal of the Society for the Propagation of the Gospel in Foreign Parts, who have deposited it in the Museum of King's College, London. It is said to be rich in fine and rare specimens of Eastern plants.

ON THE LANGUAGE OF ANIMALS.

No. II.

In the cage-singing birds, there is often a language which is not found in the natural state; directed to ourselves, and proportioned to their domestication or our familiarity to them. They who are attentive or interested, will easily learn to distinguish those new sounds, in their applications: the morning salute, or the welcome home, the demand for food, disapprobation under mistakes respecting this, remonstrance, or satisfaction, and much more. And when associated, in numbers, or with offspring, we hear and see what must be the expression of their ideas to each other, in various ways which cannot fail to be well known to persons attached to those animals, but would not be understood, and possibly, not believed, by others. And if, universally, an educated bird uses many sounds which it does not possess in the natural state, the same is true of our dogs and cats, the only other animals in which it is easy to make these observations. The more familiar those are with us, the more does the variety of their sounds, or their language, increase; while we find that these are used for specific, and often remarkable purposes. Were we unprejudiced, we should believe that they had invented new terms or phrases to express their new ideas, consistently with the general organization of their natural language; and, that in all such cases, there was that attempt at intercourse with us, which has become necessary to their new condition. It is the same in some measure with hogs; and would probably be found more widely, were we equally familiar with other animals. If any of the sounds of animals have a meaning, it is likely that the new ones express the new ideas, as the others do those belonging to the state of nature, or are attempts to converse with us; while we are at least sure that they do acquire new ideas through our education; as it may also confirm this opinion to remark, that in any one kind, it is the individual which displays the most intelligence, or is the most ambitious of our intimacy, that possesses the most intonations, and makes the largest use of them. And if there be any truth in this, they not only possess a natural language, but are, like ourselves, partially empowered to be inventors, under restrictions easily understood.

If an animal can learn the meaning of a language which is not its own, it would be a very extraordinary conclusion that its natural sounds were without one. And if to act definitely through certain sounds, is not to connect ideas with sounds, or to understand language, there is no meaning in this term. Or, this acquisition implies an accurate ear: since the sounds in question are difficult, because they are not musical, and because not related to those used by the animal itself. And it would be to reason very inconsistently, to admit that a given animal discriminated and understood the language of another, and not its own. To do this further, without previously possessing the principles of language, would be as great a miracle as that a dog should speak in a human voice: while the possession of it is equivalent to a proof of the existence and use of a natural language.

Dogs learn many of our words, and act upon them regularly and consistently. How much they can learn is well known; and the case is the same with the horse, the mule, and many more. A dog or a cat asks that the door may be opened, in some peculiar sound which it has invented; and it is confident of success. It has therefore the definite meaning in question, connected with the peculiar sound which it uses; and this is language. If a dog should ever chance to say this in our own terms, under the same expectation, we should scarcely deny that it understood the meaning of the words. Yet the parrot does the same daily, when it presents its head to our finger, under the appropriate phrase, or when, under the want of food, or drink, it asks, specifically, for those, or calls, separately, and under the equally appropriate names, or cries, the persons, or the domestic animals, with which it is associated. There are endless well known cases to prove that these animals attach definite ideas to the words and phrases which they use; and, as far as can be expected from the limitation of their faculties, what those mean. Yet it is denied that the parrot understands the meaning of its acquired language; it is said to be merely imitating sounds. It is in vain to argue against prejudices: but whoever admits the intelligence in this case, must equally admit it in that of the animals first named, using sounds of their own, instead of our language, and of which we know therefore only the general, not the precise meaning. In the parrot, there is an acquisition of new ideas, attended by the appropriate language which we happen to understand: had it made noises of its own, it would have been expressing what it now does, like the canary bird demanding food, or sugar; while they who admit its intelligence at present, might have denied it in the other case, as well as in the domesticated quadrupeds. The present conclusion must be that no animal could acquire a language did it not possess the principles of language; and that if we do not understand, ourselves, more or less definitely, their acquired ones, the result of their education among us, so are they using language in their communications with each other, when we conjecture the meaning but generally or imperfectly, or when we cannot discover it at all.

There are, however, difficulties which may be slightly stated. There are animals with very limited sounds, like the ox and the sheep; or with awkward ones, like the horse, as there are some which, like the rabbit, seldom use any. It is possible that in many of these cases, there are expressive intonations which we cannot distinguish; even in the horse, we know that there are such, as we also know of some in the sheep. It is equally possible that the dulness of the ox, social as it is, may render language little necessary; and that the rabbit and others can gain their limited ends by a pantomimic language. On nothing of this nature have we any right to decide, under our imperfect knowledge of the moral history of animals; and far less are we entitled to produce such cases in answer to the others. And if the whole subject demands that investigation which it has never yet received, let us not forget that it is our perpetual error to judge of everything, even of the Almighty, by ourselves; as our vanity also knows not how to concede that any animal can approximate in faculties to man, or even that there is anything created but with reference to him, to his understanding and his enjoyments.

The case of fishes offers the greatest difficulty of all. They can have no voice, as far as we can conjecture; and their other powers in producing sounds are very limited. Yet a very obvious question immediately arises. If they are utterly dumb, why are they provided with organs or powers of hearing, and those of great acuteness, even in the shell fishes, as is well known to fishermen? We can scarcely conceive the purpose of such a provision, but for the sake of internal communication; since none have much connexion with the sounds of the terrestrial world, and many can have none whatever. It would

be that useless and operose superfluity, of which creation furnishes no parallel example. But there is also direct evidence to the same end, in the fact that a fish which has felt the hook and escaped, often renders the fisherman's further attempts useless, by warning its companions of a danger which can scarcely be described without some power of communication equivalent to language. Whether the very distant warnings which the alarmed whale gives to its fraternity, are effected by nothing more than the stroke of the tail, is not as yet proved. We ought to conclude, from the wisdom of the Deity, furnishing the means of hearing, and from His goodness, providing for the wants of all His creation, that the marine tribes do possess the means of communication through sounds; but what those can be, we are as yet unable to conjecture.

Universally, these attributes are implicated in the grant of language to animals, adapted to their wants, and of course, fitted to their several capacities, while limited by those. We have never yet found that He has neglected anything of which we could infer the utility or the necessity; and I doubt not that we shall yet fully prove, that He has not neglected this, but that all the animals which he has appointed have been endowed with language, or means of communication, adequate to their uses and subservient to their happiness.

[Abridged from MACCULLOCH's *Proofs and Illustrations of the Attributes of God.*]

FACTS IN COMPARATIVE ANATOMY.

No. III.

THE TONGUE OF THE WOODPECKER.

THE food of the woodpecker consists of beetles, ants, and other insects, which are found concealed in the crevices of the wood or beneath the decayed bark of trees. To enable the creature to obtain its concealed prey, it is furnished with a strong beak, flattened on the sides, and sharpened at the extremity like a chisel; with this powerful instrument it strips off the bark with great rapidity, or removes the rotten wood that protects the insects of which it is in search. An American species of this bird, on account of its habits, has been called the Carpenter of the Woods; in some places it is considered injurious to plantations, but this idea is erroneous, for it never attacks any but decayed trees, and its operations are productive of good instead of harm, by destroying the insects before they have time to attack the other and more healthy trees of the plantation.

Although the beak of the woodpecker is of essential service to its owner in discovering its prey and placing it within its reach, it is but ill adapted for the purpose of securing it; on this account it is furnished with a singularly-constructed tongue, having a muscular apparatus of an extraordinary nature. The tongue itself, A, as seen in the engraving, is long and slender, with a number of small bristles at the tip; this tongue the bird is enabled to thrust out to a great extent and again withdraw with rapidity. To effect this it has a most singular arrangement of muscles attached to the *os hyoides*, or bone of the tongue; the two pieces of which this bone is formed, are curved, united at C, and fixed at their other extremity to each side of the tongue.

After extending backwards for some distance they are suddenly bent upwards and then forwards, passing over the back of the head, (see fig. 2,) and uniting themselves at last in one of the nostrils at A, in which they are fixed. A strong pair of muscles are attached to those portions of these bones which are in contact with the tongue, and these muscles (E E, fig. 1,) passing backwards, are wound in a most singular manner

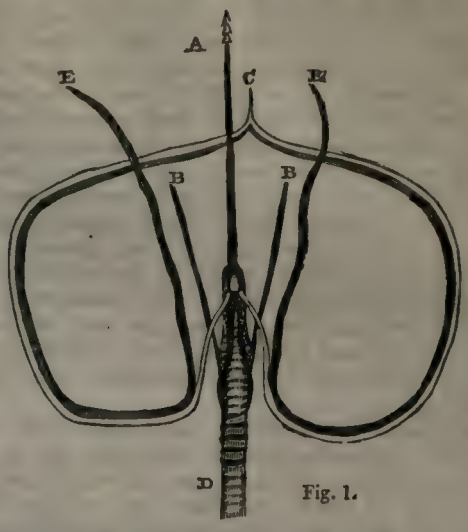


Fig. 1.

round the windpipe D. By this means a very strong purchase is obtained, and the tongue, if thrust into the hole in which the insect is concealed, can be quickly withdrawn. The two short muscles B B, which are fastened to the underside of the lower mandible and to the forepart of the windpipe, draw the tongue forward, and direct it into the cleft in the tree. The end of the tongue is provided with barbs or bristles for the purpose of entangling the insect-prey of the woodpecker; but this contrivance would of itself have been hardly sufficient for the intended purpose, if other means had not been prepared.

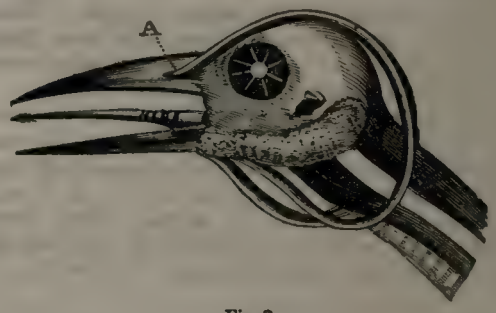


Fig. 2.

Fig. 2 is the side view of the head of a woodpecker deprived of its skin and feathers. At the hinder and lower parts, immediately below the eye, a large substance may be perceived; this is a gland for the purpose of secreting a glutinous fluid. The opening of this gland is inside the mouth, and the fluid it secretes is poured into the hollow of the lower jaw; the end of the tongue every time it is returned into the mouth is dipped into this liquid, as a camel-hair pencil might be into gum water, and being charged is thrust into the hole in which the insects are found; these adhering to the tongue are drawn back into the mouth of the bird. And here again another contrivance is to be found; a number of hairs are fixed at the back part of the mouth, which, acting like a brush, take off the insects which have been brought in, and enable the bird to swallow them without loss of time, for the woodpecker being rather a large bird, and its prey but small, it is a matter of necessity that it should be quick at its meals.

PAINTING is the intermediate something between a thought and a thing.——COLERIDGE.

THE TRUFFLE, (*Tuber cibarium*).

The Truffle is a species of the fungous or mushroom tribe, well known as an article of luxury, when employed in the preparation of made-dishes. The Truffle grows beneath the surface of the earth, and has no appearance of a root; its form is that of an irregular globe, covered with small rounded prominences; its substance varies in colour from white to grayish, marbled, and brown; its smell is powerful and pleasant, and it is considered a great delicacy.

Truffles are found in most of the temperate climates of the Old World, and also in North America. In Piedmont, and in some parts of France, they are met with in great abundance. In France they are chiefly found in forests among oak and chestnut-trees. In England Truffles are found chiefly in the chalky districts of Sussex, Hampshire and Wiltshire.

The search after Truffles takes place from the month of October to January, when they are in the greatest perfection. Dogs are usually trained for this purpose, but in France it seems pigs are often employed, the fondness of these animals for this fungus rendering them good judges of its locality; but in this case great vigilance is necessary on the part of the Truffle-hunter, for the pig, in its eagerness to obtain the Truffle, is apt to crush it, and render it unfit for market; on this account the dog is best, being so much more docile.

The soil in which the Truffles are found, is loose, moist, gravelly earth, where they grow as near as three or four inches beneath the surface; the ground above them is generally bare, and returns a dull or hollow sound when struck. It has been remarked as a singular fact, that the more numerous the Truffles are in any place, the larger they are. When Truffles have reached maturity they split in all directions and fall to pieces, forming a soft moist mass, from which the young Truffles spring.

Many agriculturists have endeavoured to form artificial Truffle-beds, but the experiment has met with such indifferent success, that it is said only one experiment proved even the possibility of the thing.

The Truffle is cooked in various ways, being broiled on the coals, cut up into salad, used like the mushroom, as seasoning, and stewed in wine, &c.

Fig. 1.

Fig. 2.

The mode in which the Truffle increases is rather singular. Fig. 1 represents this fungus in a perfect state; if allowed to become ripe, and then cut open, a section of its substance will show the young Truffles in the interior, as seen in fig. 2. If it is not gathered when ripe, the whole mass falls to pieces, the young plants are at liberty, and for a time gather nourishment from the remains of their progenitor, and then, in their turn, increase, ripen, and decay.

CORONATION ANECDOTES. No. IV.

Edward III.

On the deposition of Edward II., his son, Prince Edward, was brought to a general assembly of the nobles and clergy in the abbey church of Westminster, on the 20th of January, 1327, and Walter Raynold, taking for his text the old aphorism, "*Vox populi, vox Dei*, (The voice of the people is the voice of God,) exhorted all present to choose the young prince for their sovereign. All assented; but the prince himself declared that he would not accept the crown until it had been voluntarily resigned by his father. The consent of the deposed monarch was easily obtained, and Edward, having been previously knighted by the Earl of Lancaster, assisted by the Count of Hainault, received the crown from the hands of the archbishop of Canterbury, on the following feast of the Purification of the Blessed Virgin. The only remarkable circumstance, connected with this coronation, was the detestable hypocrisy of the queen dowager, Isabella, who, though she had been the principal cause of the late king's deposition, affected to weep during the entire ceremony.

A remarkable coronation medal was struck on this occasion; on one side the young prince was represented crowned, laying his sceptre on a heap of hearts, with the motto, "Populo dat jura volentes," (*He gives laws to a willing people*,) and on the other was a hand held out to save a falling crown, with the motto, "Non rapit sed recipit," (*He seizes not, but receives.*)

Philippa, queen of Edward III., was crowned on Quinquagesima Sunday, February 18, 1330; but no particulars are recorded.

Richard II.

The coronation of this king was more magnificent than any of the preceding, and we have in Prynne a perfect copy of the ritual used upon the occasion. It also affords us the first record of the Court of Claims, which was holden by John of Gaunt, duke of Lancaster. The following extract from the record in Speed's Chronicle will show the nature of the proceedings: "John, the king's eldest uncle, under the style of John, king of Castile and Leon, and duke of Lancaster, by humble petition to the king, claimed to be now steward of England, in right of his earldome of Leicester; and, as he was duke of Lancaster, to beare the king's chief sword, called Curtana; and, as earle of Lincolne, to cut and carve before the king. His petitions being found just were confirmed to him, and to his assigns, the two earles of Derby and Stafford, the first to beare the sword, while the duke should be busied about other offices as steward, and the other to cut and carve. The duke then, in great estate, held this, the king's high court of stewardship, in the Whitehall of the king's pallace at Westminster, neere to the chappell of the said palace, upon the Thursday before the coronation, which was also upon a Thursday. Then Thomas of Woodstocke, the king's uncle, was admitted to exercise the office of constable of England, in right of his wife, one of the daughters and heirs of Humfrey de Bohun, late earle of Hereford, and constable of England. Henry de Percy was, by the king's consent and writ, authorized to exercise the place of Marshall of England for that time, saving to every one their own right, for that by reason of the time's shortnesse, the claime which Margaret, daughter and heire to Thomas of Brotherton, late earle of Norfolk and marshall of England, laid thereunto, could not be discussed."

The procession of the king from the Tower to West-

minster, on the day preceding the coronation, is thus described by Holinshed: "The citie was adorned in all sorts most richlie. The water conduits ran with wine for the space of three hours together. In the upper end of Cheape, was a certeine castell, made with foure towers, out of the which castell, on two sides of it, ran forth wine abundantly. In the towers were placed foure beautifull virgins, of stature and age like to the king, apparelled in white vestures, in every tower one, the which blew in the king's face, at his approaching neere to them, leaves of gold; and as he approched also, they threw on him and his horsse, counterfeit florens of gold. When he was come before the castell, they tooke cups of gold, and, filling them with wine at the spouts of the castell, presented the same to the king and to his nobles. On the top of the castell, betwixt the foure towers, stood a golden angell, holding a crowne in his hands, which was so contrived that when the king came, he bowed downe, and offered to him the crowne. But to speake of all the pageants and shewes, which the citizens had caused to be made, and set forth in honour of their new king, it were superfluous, everie one in their quarters striving to surmount other; and so with great triumphing of citizens, and joy of the lords and noblemen, he was conveied unto his palace at Westminster, where he rested for that night."

The ceremony of the coronation was so fatiguing, that Richard was obliged to be borne back to the palace on knights' shoulders, where he rested awhile, and took some slight refreshment. He then created four earls and nine knights. Of the coronation-feast, Holinshed says, "To show what roiall service was at this feast, it passeth our understanding to describe; but to conclude, the fare was exceeding sumptuous, and the furniture princelie in all things, that if the same should be rehearsed, the reader would doubt the truth thereof. In the midst of the king's pallace was a marble pillar, raised hollow upon steps, on the top whereof was a great gilt eagle placed, under whose feet in the chapiter of the pillar, divers kinds of wine came gushing forth at foure several places all the daie long, neither was anie forbidden to receive the same, were he never so poor or abiect."

Anne, queen of Richard II., was crowned at Westminster by Archbishop Courtney, January 22nd, 1382, as Holinshed says, "with all the glorie and honour that might be devised." He adds, "There were also holden, for the more honour of the same marriage, solemn justes for certeyne daies togethir, in which as well the Englishmen, as the new queene's countriemen, shewed proofe of their manhood and valiancie, whereby praise and commendation of knightlie prowesse was achieved, not without damage of both the parties."

Thus splendidly began a reign, destined to have a very sad termination. In the 23rd year of his reign, Richard was taken prisoner by his cousin the duke of Lancaster, and brought to London, where he was committed to the Tower, or else he would have been torn to pieces by those very citizens who had hailed his coronation with such enthusiastic joy. Articles of impeachment were exhibited against him in parliament, and commissioners appointed to examine the king on those charges. Richard prevented the necessity of a formal trial by a resignation, which, however, could scarcely be called voluntary, and this being communicated to the parliament, commissioners were appointed to prepare and publish the sentence of the king's deposition. This very remarkable instrument is so little known, that we shall insert it.

In the name of God, Amen. We, John bishop of St. Asaph, John abbot of Glastenbuire, Thomas earle of Gloucester, Thomas Lord Berkelie, William Thirning, justice, Thomas Erpingham, and Thomas Graie, knights, chosen and deputed special commissaries by the three states of this present parlement, representing the whole of the bodie of the realm, for all such matters by the said estates to be committed; We, understanding and considering the manifold crimes, hurts, and harmes, done by Richard king of England, and misgovernance of the same by a long time, to the great decaie of the said land, and utter ruine of the same shortlie to have beene, had not the speciall grace of our God thercunto put the sooner remedie: and also furthermore adverting that the said Richard, by acknowledging his owne insufficiencie, hath of his owne meere voluntie and free will renounced and given over the rule and governance of the said land, with all rights and honours unto the same belonging, and utterlie for his merits hath judged himselfe not unworthilie to be deposed of all kinglie maiestie and estate royall. We, the premisses well considering, by good and diligent deliberation, by the power, name, and authoritie, to us (as is above said) committed, pronounce, decerne, and declare, the same King Richard, before this to have beene and to be, unprofitable, unable, insufficient, and unworthie of the rule and governance of the foresaid realms and lordships, and of all rights and other the appurtenances to the same belonging. And for the same causes, we deprive him of all kinglie dignitie and worship, and of any kinglie worship in himselfe. And we depose him by our sentence definitive, forbidding expresselie to all archbishops and bishops, and all other prelates, dukes, marquesses, erles, barons, and knights, and all other men of the foresaid kingdome and lordships, subjectes and lieges, whatsoever they be, that none of them from this daie forward, to the foresaid Richard, as king and lord of the foresaid realmes and lordships, be neither obedient nor attendant.

This sentence having been solemnly read, was accepted by the parliament, and ordered to be entered on the records of the realm. The same commissioners were then appointed to wait upon the king the next morning, and in the name of the three estates renounce their homage and fealty. When the sentence was thus ratified, the duke of Lancaster arose, and read the following challenge or claim to the crown, which was ordered to be recorded in the rolls of parliament:

In the name of the Father, and of the Sonne, and of the Holie Ghost, I, Henrie of Lancaster, claime the realme of England, and the crowne with all the appurtenances, as I that am descended by right line of the blood, comming from that good lord, King Henrie the Third; and through the right that God of his grace hath sent me, with the helpe of my kin and of my freends, to recover the same, which was in point to be undoone, for default of good governance, and due justice.

To this claim the lords gave a tacit but unanimous assent. The archbishop of Canterbury then stood up and asked the commons, who then sat in the same chamber with the peers, whether they also assented to the duke's claim? He was answered by a shout of approbation; upon which he went to the duke, and taking him by the right hand, led him, supported by the archbishop of York, to the throne. The archbishop of Canterbury then preached a sermon to the assembly, taking for his text 1 Samuel ix. 17, *Vir dominabitur in populo:* "This man shall rule over my people."

On Wednesday the 1st of October, the commissioners above named went to the Tower, and declared to Richard that he had been deposed, and Henry placed upon the throne. Then Justice Thirning, in the name of the rest, and for all the estates of the realm, renounced homage and fealty to Richard in solemn form. The unfortunate monarch wept bitterly while this degrading ceremony was performed, and could not avoid reverting to the enthusiasm with which his coronation had been celebrated by all classes of his subjects.

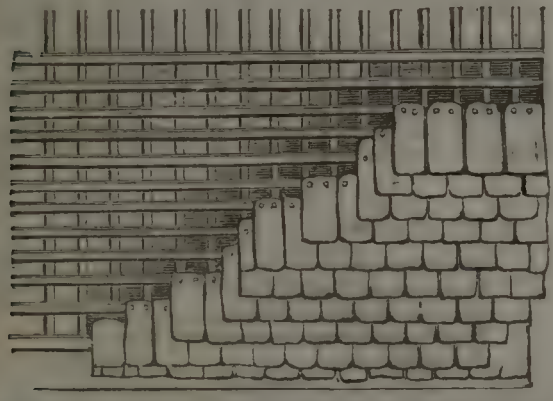
I WISH our clever young poets would remember my homely definitions of prose and poetry: that is, prose = words in their best order; poetry = the *best* words in the best order. —COLERIDGE.

THE USEFUL ARTS. No. XXXVIII.

The Slater.

The slate used for roofing constitutes extensive strata among the primary rocks of the crust of the globe, and is termed *clay-slate*. Its structure, scientifically called *Schistose*, admits of its being split into thin laminæ, by means of wooden wedges. These laminæ are roughly *squared* by means of a *pick*, or hammer, at the quarry: they are then sorted, according to their size and quality, and are brought to market under the quaint names of *Imperial slates*, *Duchesses*, *Countesses*, &c., the former being the largest. The principal British slate-quarries are situated in North Wales, and the best roofing-slates come from the celebrated vale of Festiniog.

Slates are laid on *battens*, or thin narrow deal boards, which are nailed horizontally on the common rafters of the roof, at equal distances apart, which distance is governed by the sized slate to be employed. An entire board is nailed along the lowest edge of the roof to receive the lead of the gutters, which are first laid, and then the lowest *course* of slates are nailed and pinned down to the lowermost batten; so that two-thirds the length of the slate, at least, should lie over the lead. The next course of slates is then fixed, so that every slate shall overlap two-thirds the depth of the course below it, every slate being also laid over the joint, between two slates of that undercourse. By this construction the rain that runs through the joint between any two slates, is kept from penetrating into the roof by being received on the surface of the slate beneath that joint; and the bottom course of slates is double, to continue the same principle down to the lead gutter.



The slates are fixed to the battens by two copper nails and a wooden pin when the work is well executed; holes being picked through each slate for the nails to pass through.

The Plumber.

The comparative cheapness of lead, its admirable qualities, and the facility with which it can be cast and rolled into thin sheets, and drawn into pipes, cause it to be extensively used in building. The most productive mines of this metal in our own country, are situated in Derbyshire, Devonshire, Cornwall, in Wales, and in the North. In short, the ore from which lead is generally obtained, called *Galena*, or *Sulphuret of Lead*, is found in all countries where the primary rocks appear at the surface. The ore greatly resembles the pure metal in brilliance; but it is brittle and not so easily fused. It frequently contains a sufficient quantity of silver to make it worth while to adopt a peculiar process in the reduction of it, in order to separate this more valuable metal. The ore is first broken into small pieces, and is then *roasted* in a reverberatory furnace, to drive off the sulphur. When this object is attained, the heat is increased, till the metal is fused, and then it is drawn off into moulds, which give it the form of blocks or slabs, called *Sows and Pigs*.

Sheet Lead is made by pouring the melted lead on a large table, covered over with an even surface of fine sand, and having a ledge of an equal height above the sand all round it. When the melting metal is poured on the sand, two men, holding each end of a stiff wooden rule, called a *strike*, draw it along the table, resting on each side ledge, the liquid lead is pushed onwards by the strike, till it covers the whole surface of an even thickness, which of course is governed by the depth of the ledge round the table.

Milled Sheet Lead is formed by rolling a cast plate of the metal between large iron rollers, turned by a steam-engine. These rollers are set closer and closer together, till the lead is reduced by rolling to the requisite degree of thinness. By this process the lead is rendered more dense, and more equally so, than it ever is by simply casting; milled lead, consequently is more durable than the latter.

It should be here noticed that lead, when it is used for roofing, or for lining cisterns and gutters, is always laid on an uniform boarded surface, and not on battens or laths, like slate and tiles.

Lead pipe is either formed by bending thin sheet lead round a cylindrical mould, and soldering the joint, or when the pipe is less than four or five inches in diameter, the pipe is formed by casting a thick cylinder of lead with a small bore, and about five or six feet long. A long smooth iron rod, a little larger than the bore of the cylinder, is forced into this, and then the cylinder is gradually drawn through a succession of circular holes, decreasing in diameter, in a steel plate, by means of a powerful draw-mill, worked by a steam-engine. The lead is by this process extended out over the iron rod, which keeps the bore of the pipe of an equal diameter, and when the pipe is sufficiently reduced in thickness, the rod, or *triblet*, is forcibly drawn out, and the pipe left with a smooth bore, ready for use.

When a roof is to be covered, or a cistern lined, with lead, the sheet of the metal is unrolled on a level floor, and made free from creases and undulations by beating them down with a heavy wooden *flogger*, like a roller with one flattened side, and a handle to it. The plumber then draws on the lead the form into which it must be cut to fit the surface it is intended to cover, and afterwards cuts through the lines described with a sharp strong knife. The piece is then rolled up again for facility of carriage, and raised by tackle into its intended situation, it being placed there so that when again unrolled, it may lie in the proper situation and position on the boarding. The sheet is then again beat out flat by the flogger.

The next sheet being put into its place, and so that the edges of the two may overlap about one and a half or two inches, the workman proceeds to make the joint, or to solder the two sheets together. The first step for this purpose is to scrape the two edges or borders of the sheets that are to come in contact quite clean and bright, with a tool constructed for this purpose, consisting of a small triangular bit of steel ground sharp at its edges, and fastened at right angles on an iron socket, fixed in a handle. When these borders of the lead are quite clean, they are painted over with black lead-paint, to prevent their tarnishing, or *oxidising* again, as the solder will only adhere to a clean pure metallic surface. The paint also serves as a flux to cause the solder and lead to melt together, and thus make a close joint.

Plumbers' solder is made of lead and tin melted together, in the proportions of two parts of the former to one of the latter metal. This alloy is fusible at a lower temperature than the tin or lead separately. The solder is cast into triangular bars, weighing from thirty to fifty pounds each. The solder is melted in an iron ladle, on a rude temporary fire-place, built as near the spot where the solder is wanting as possible. The plumber having turned back the edge of the upper sheet at the joint, an assistant carefully pours the solder on the lower edge. The workman then spreads it evenly along the joint, by means of *soldering-irons*, which are irregular-shaped iron bars, swelling at their ends into rounded forms of different sizes and shapes, according to the particular purpose for which they are intended. These irons are heated red-hot when they are to be used to keep the solder melting while it is being spread.

As soon as the workman has spread the solder, he presses and hammers down the upper edge on the lower, spreading the solder forced out of the joint, by so doing, along the seam. The outermost edge of the lead covering is nailed down to the boarding or cistern-frame by nails, with their heads leaded over, to prevent the corrosion of the metal, by the chemical or *voltaic* action that takes place when two metals are in contact exposed to moisture. The situation of the soldered joints depends on the size and form of the surface to be covered over; and a good workman considers well how he can cut out the lead so as to have the fewest joints, and these in the most favourable situations. If it is a cistern he has to line, he will cover the bottom in one piece, cutting the lead large enough to admit of its turning up for an inch or two, at two of the sides, the joint consequently being made at these angles.

When a large roof, like that of a church, is covered with

lead, this is laid on in parallel bands as wide as the sheet will admit of, the edge of one sheet being turned over a wooden roller or fillet, nailed down on the boarding to receive it, while the edge of the next sheet is turned over the former lead again; the double thickness being well *flogged* down to render the joint water-tight: and in this case no solder is used.

The edges of lead gutters that turn up against the inside of the parapet are either laid as flat against the brick-work as possible, and secured so by iron *holdfasts*, so as to prevent rain from getting in, or are else, to effect the same object in all the better kind of buildings turned into a joint, in the brickwork, between two courses.

When the plumber has to join two lengths of lead-pipe into one, he opens out the end of one length into a funnel-shaped aperture, by gently driving a wooden cone into it, so as to avoid splitting the pipe. The end of the other length is then scraped down a little by the triangular tool before mentioned, not only to obtain a clean surface for soldering, but to allow of the end fitting into the funnel-shaped aperture alluded to. The two pipes being thus put together, the workman holds a thick wadding of old woollen cloth, well greased, under the joint, while a labourer gently pours melted solder over the joint, which the plumber smooths and shapes down by his soldering-iron and the cloth, into a regular smooth rounded swelling, all round the joint, making this perfectly close and water-tight.

Within the last twenty years the metal zinc has been much used instead of lead for all the purposes of the latter, and many others beside, for which the admirable qualities of zinc particularly qualify it. This metal is lighter than lead, and equally durable in the open air. It bears water nearly equally well; but it is not so flexible or manageable, being neither so fusible nor malleable. Zinc only admits of being rolled or hammered when it is heated to about two hundred and twenty degrees of Fahrenheit. When cold it is too brittle to bear much bending; nevertheless pipes, gutters, cisterns, chimney-pots, &c., are made out of sheet-zinc, and roofs, &c., covered with it.

The Plasterer.

The business of this workman is to cover over the rough walls and ceilings of a building with *plaster*, a better kind of mortar, made of lime only; and when this plaster is of the coarser kind for the under or first coating, cow-hair is mixed with it to make it bind better. When it is a plain brick-wall which is to be plastered, the surface is at once covered with the plaster, this adhering readily to the rough brick-work: but for ceilings or partitions, a groundwork of laths is required to receive the first coating.

Laths are of different sizes and qualities according to the various work for which they are intended. Those used by the plasterer are termed *single*, and are about from two to three feet long, an inch broad, and a quarter of an inch thick. They are split out of a coarse kind of deal. *Double* laths are considerably longer and thicker, and are sawn out: they are therefore regular in their size. They are used for better work in plastering, but chiefly by tilers or slaters.

The single laths are nailed up to the joists of the ceiling, or to the *quartering* of partitions, with but a small interval between each, and entirely to cover the surface. The workmen then proceed to cover the lathing with coarse plaster, a labourer supplying them with a small quantity at a time on a square board, held in the plasterer's left hand by means of a short thick handle stuck upright into the back of the board. The man uses a rectangular flat wooden trowel, with a bridge-shaped handle, to transfer the *stuff* from the board to the wall, and to spread it evenly over the surface. When the room of which the walls are being plastered is of a better description, the work is *floated*, that is, a regular surface is obtained by drawing a long straight-edge over the wet plaster, so as to scrape off the inequalities and reduce the whole to a plane surface.

A thinner coating of finer plaster is spread over the first to finish the plastering, and this is again floated in drawing-rooms, and so on.

The mouldings of cornices in rooms are formed by a wooden mould drawn along a straight-edge to guide the mould, acting like the carpenter's plane, when forming analogous mouldings in wood. When such cornices are of sufficient size and depth to require it, wooden brackets, shaped something like the profile of the cornice, are fixed up against the wall, and laths are nailed on these brackets, to serve as a foundation for the mouldings. By this means the necessity for a heavy mass of plaster, to get the requisite projection in the cornice is avoided; which mass would be unwieldy to manage, and liable to fall down by its weight.

Foliage and ornamental work in plaster is made by *modelling* the ornaments by hand, in a proper kind of clay, worked by steel or wooden tools, resembling small spatulas in form. To do this requires a taste and skill in drawing or designing in the workman, which raises him to the rank of an artist. When the model is finished and dry, the surface of it is covered with a thin coat of oil, and a mould of fine plaster is taken from it in separate pieces. To allow of the plaster mould being taken off the model, the edges of these separate pieces of the mould are made smooth, so as to fit accurately together. From this mould any number of *casts* may be taken by pouring fluid plaster into the mould when it is put together; and as soon as each cast has *set*, or become hard, the mould is taken off it, to be put together again for a new cast.

Old plaster ceilings, walls, &c., are cleaned by being *whitewashed*. The plaster is first washed over with clean water, by means of broad flat brushes, to remove the dirt. All cracks and defects in the plaster are then *stopped* by filling them up with new plaster, and it is frequently necessary to cut away the plaster in such places to obtain a clean new surface to enable the new plaster to adhere. When the surface is dry, the whitewash, made of whiting, mixed up in water, is laid on with the same form of brushes, and two or three times gone over, effectually to cover all stains and marks on the surface. Instead of being whitewashed, walls are frequently coloured by mixing ochre, of the proper tint, in the water along with the whiting.

The outside of walls of houses, &c., are now frequently covered with stucco, a kind of plaster made with a lime that resists the action of water, when set, and which, if well managed, causes the wall to look as if built of stone. The mode of stuccoing walls is exactly the same as that of covering them with common plaster.

We here conclude our account of the Useful Arts connected with house-building.

And what's the Poet if the man be naught?
. . . . . Genius and wit
May flourish for a day, and snatch the wreath
From awkward probity; but soon shall fade
The ready laurels of a vicious muse,
While amaranthine honours crown the brow
Of unpoetic virtue. Hurdis.

If the peculiarities of our feelings and faculties be the effect of variety of excitement through a diversity of organization, it should tend to produce in us *mutual forbearance and toleration*. We should perceive how nearly impossible it is that persons should feel and think exactly alike upon any subject. We should not arrogantly pride ourselves upon our virtues and knowledge, nor condemn the errors and weakness of others, since they may depend upon causes which we can neither produce nor easily counteract. No one, judging from his own feelings and powers, can be aware of the kind or degree of temptation or terror, or the seeming incapacity to resist them, which may induce others to deviate.—Abernethy.

Amongst the causes assigned for the continuance and diffusion of the same moral sentiments amongst mankind, may be mentioned *imitation*. The efficacy of this principle is most observable in children; indeed, if there be anything in them which deserves the name of an *instinct*, it is their *propensity* to *imitation*. Now there is nothing which children imitate, or apply more readily, than expressions of affection and aversion, of approbation, hatred, resentment, and the like; and when these passions and expressions are once connected, which they soon will be by the same association which unites words with their ideas, the passion will follow the expression, and attach upon the object to which the child has been accustomed to apply the epithet. —Paley.

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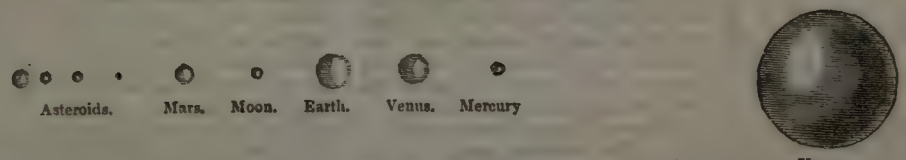
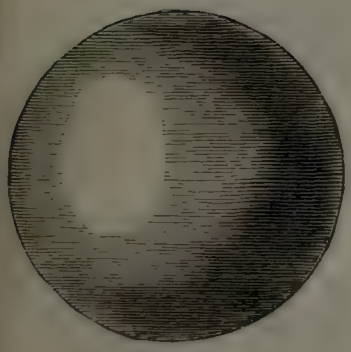
POPULAR ASTRONOMY. PART II.

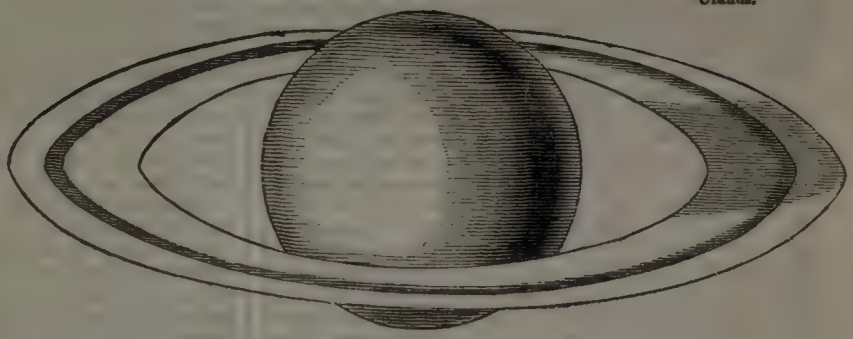


Asteroids. Mars. Moon. Earth. Venus. Mercury

Uranus.



Jupiter.



Saturn.

COMPARATIVE SIZES OF THE PLANETS.

> But yonder comes the powerful King of Day,
> Rejoicing in the East. The lessening cloud,
> The kindling azure, and the mountains brow
> Illumed with fluid gold, his near approach
> Betoken glad. Lo! now, apparent all,
> Aslant the dew-bright earth, and coloured air,
> He looks in boundless majesty abroad;
> And sheds the shining day, that burnish'd plays
> On rocks, and hills, and towers, and wandering streams,
> High gleaming from afar.

THUS does Thomson, the philosophic poet of the *Seasons*, speak of the approach and vivifying influence of that splendid body,—the Sun,—whose daily return brings with it so much that renders pleasure and benefit to man.

In our first article, we gave a general view of the relation existing between the different heavenly bodies. The appearances which are presented to the eye of an observer, an enumeration of the classes into which, for the sake of convenience, the heavenly bodies may be divided, and a short exposition of the mode in which the theory of gravitation is brought to assist us in the comprehension of their motions, were the subjects which then occupied us. We proceed now to consider each of the planets separately, by which means we shall be able to collect the principal facts and circumstances connected with each planet, so far as that can be done without the aid of mathematics, which must not form a prominent feature in our plan.

Before proceeding to the consideration of the heavenly bodies separately, it will be convenient to consider the relation which exists between them all, as regards dimension. Our frontispiece represents the comparative sizes of the Moon and planets. By this we shall, of course, be understood to mean, that the twelve circles represented above, bear the same proportion one to another, as the diameters of the planets bear to one another, respectively. The Sun is so very much larger than any of the planets, that we could not introduce into our figure a circle, which would indicate his comparative diameter. This will be rendered evident by the consideration that a circle showing correctly the comparative size of the Sun, must be one hundred and eleven times as large in diameter as the circle representing the Earth.

The diameter of the Earth, as we shall hereafter have to show more fully, is about 7920 miles. If now, for the sake of fixing our ideas, we call that quantity 1, then the diameters of the other bodies will be represented by the following numbers:—

☉	Sun	111,454
♃	Jupiter	10,860
♄	Saturn	9,987
♅	Uranus	4,332
⊕	Earth	1,000
♀	Venus	0,975
♂	Mars	0,517
☿	Mercury	0,398
☾	Moon	0,273
⚴	Pallas	0,265
⚵	Juno	0,180
⚳	Ceres	0,130
⚶	Vesta	0,030

The last four must be considered as approximations to the true proportions; as the diameters of those small planets have not yet been defined with so much precision as those of the other planets. In astronomical works, these heavenly bodies are frequently expressed by symbols appropriated to them. Before the name of each we have placed the symbol, which distinguishes it among astronomers.

The names of the heavenly bodies, before mentioned, are derived from the heathen gods, who also gave their names to such of the metals as were known to the ancients, and likewise to the days of the week.

The planets Uranus, Pallas, Juno, Ceres, and Vesta, were not known before the last sixty years. They have all been generally named from the relationship of one deity to the other; the moderns having called the planet discovered by Herschel Uranus, who, in the heathen mythology, was the father of Saturn, who was the parent of Jupiter, of whom Mars was the son. The Moon, called Luna, was said to be the daughter of Terra, the Earth. The characteristics of the planets were also indicated by the known qualities of the deities whose names they respectively assumed. The Earth, being considered as the parent of all created nature, was designated from the goddess whom the ancients invoked to dispense all natural blessings. It founded the centre of their astronomical system, as we showed in the former paper. The planet Mercury, seldom seen, and then but for a short time, resembled "the fleet messenger of the gods." Venus, the most beautiful of all the planets, was the type of the charming goddess of this name. Mars, with its red appearance, showed the wrathful countenance of the god of war. Jupiter, the largest of

the planets, resembled the mighty "father of gods and men," while the dim-looking Saturn had its counter-part in the figure of the aged and morose progenitor of Jove.

The metals, and the days of the week, which correspond respectively to the Sun, Moon, and five planets, may be seen in the subjoined table.

Sun	Gold	Sunday.
Moon	Silver	Monday.
Mars	Iron	Tuesday.
Mercury	Quicksilver	Wednesday.
Jupiter	Tin	Thursday.
Venus	Copper	Friday.
Saturn	Lead	Saturday.

We need not seek to account for the connexion of gold with the Sun, nor of silver with the Moon, when the poets of all ages and nations have celebrated "the golden sun," and "the silvery light of the moon." From iron the god of war formed the weapons of destruction; while the nimble Mercury, that slippery, light-fingered fellow, the patron of roguery throughout the ancient world, was well identified with quicksilver. The metal tin seems to have been assigned to Jupiter, from the circumstance that the Corybantes, the priests of Cybele, who tended the infancy of Jupiter in Crete, used to drown his cries by the clashing of their tin cymbals. Copper is connected with the name of Venus, who was the tutelar deity of the island of Cyprus. This place, where Venus was born, formerly supplied the world with copper from its mines, and honoured Venus above all deities. Lead may have been set down as the type of Saturn, in consequence of the dull, lead-like appearance of that planet.

The days of the week were respectively connected with each planet, as each planet was said, according to the old astrological rules, to be in the ascendant for the particular day.

We need bring no arguments to show that we are justified in selecting the sun as the first object of our attention:—both from the influence which his superior dimensions enable him to exert on the other planets, and from the vast importance which attaches to him, as the source of light and heat to the other bodies of the solar system.

THE SUN.

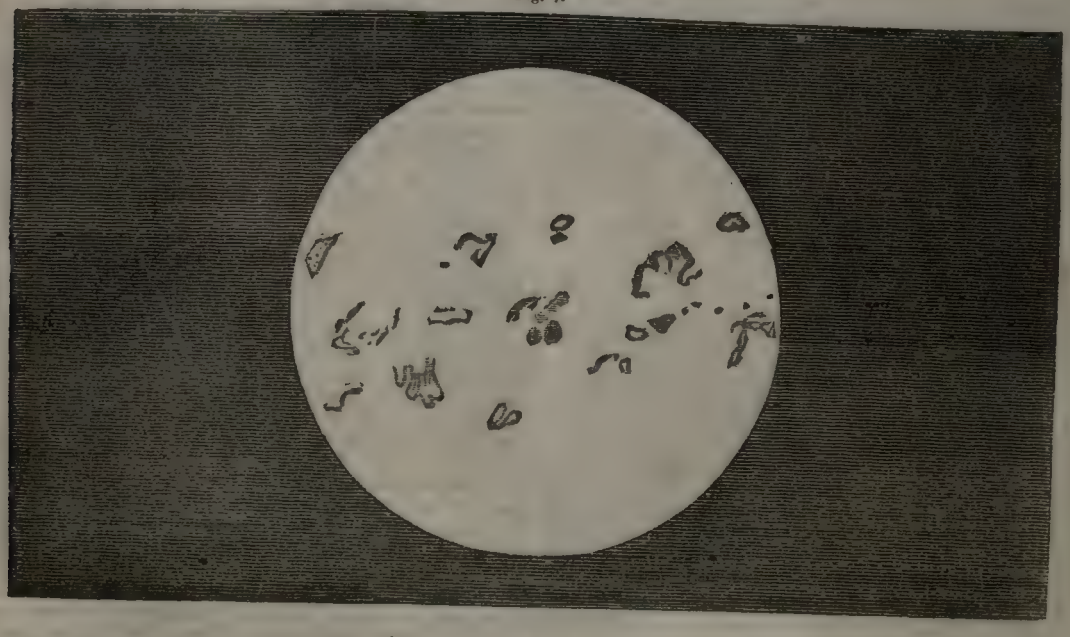
This magnificent globe is 883,210 miles in diameter, about 2,774,692 miles in circumference, and distant from the earth about ninety-five millions of miles. It will be convenient to consider this luminary under three points of view:—1st, His apparent dimensions, as influenced by distance:—2nd, The phenomena presented by him as a source of light:—3rd, The heating effect of his rays.

1. The Sun has but a very small motion in the heavens which is due to the attraction of the different planets nearly all the variations which appear in his dimensions arise from the motion of the planet on which the spectator is situated, and not from the motion of the Sun. But, although the motion of the Sun in an orbit is very small, never extending beyond the length of the solar diameter, yet he has another species of motion quite independent of any change of place; we mean a motion round his axis, which is completed in twenty-five days. The means by which this motion is made manifest, are the disappearance and re-appearance of certain dark, or shaded spots, on his brilliant surface. These spots we shall have to allude to further on; but we may now state, that certain dark spots appear to travel, as it were, across the sun,—disappear at the western edge,—become lost for a time to the view,—re-appear at the opposite or eastern edge,—and then attain their former position. This can only occur on the supposition that the sun revolves on his axis; and the period of such revolution, as determined by these spots, after making allowance for the motion of the earth, is, as we have stated, about twenty-five days. It is easy to produce familiar illustration of such a motion. Suppose that we have an orange, with a dark spot on one part of its surface: if we turn the orange round on its axis, that is, in the way that a top spins, we shall find that the dark spot will gradually reach one edge of the visible part of the orange,—pass round on the remote side,—and re-appear on the opposite edge from that at which it previously disappeared.

The apparent size of a body to a spectator depends on two circumstances:—First, the real size of the object; and secondly, the distance at which it is placed from the observer. Now, as we may reasonably suppose that the sun's dimensions are constant, any variation in his apparent size must be due to distance. It may now be asked by one who has not previously thought of these subjects, how we can describe in words, the size of which the Sun appears to us? If we say that he looks as large as an orange, no definite information is conveyed to the mind by such a statement; because, if an orange be held at a few inches distance from the eye, it will appear much larger than the Sun; whereas, if it be held at some yards distance, it will appear smaller than the Sun. It is obvious, therefore, that we must devise some other mode than comparisons of this sort, if we wish to convey to others an idea of the size of an object.

The mode, which is adopted for this purpose, is to express the angle, which the diameter of a body *subtends*, or *is opposite to*. As we shall frequently have to speak of

Fig. 7.



the word *angle*, it may be desirable to explain in this place what is meant by that term, and how angles are measured. Suppose that we have a stick, or any other object, which we wish to place upright, on one of its ends, on a table. We know that, unless it be quite upright, it will fall; and by the word *upright*, we mean that it inclines neither one way nor the other. Now it has been agreed that we shall call the position which the stick thus occupies with respect to the table, by the name of a right angle. Thus, (fig. 8,) if A C be the stick standing upright on the table C B, the opening or space included between the stick A C, and the table B C, is called a *right* angle. Suppose, now, that we

lean the stick into the direction denoted by the dotted line DC: then the opening or space included between the stick and the table will be smaller than before. When we incline the covers of a book towards each other, in the act of closing the book, we produce a similar effect to that which we have just noticed;—that is, we make two lines, or two surfaces (as the case may be,) close towards each other, as if one were about to lie on the other. This effect, then, is expressed, by saying that the angle DCB is smaller than the angle ACB. (We always place the letter attached to the point of junction of the two lines, between the two letters indicating the other ends of those lines.) If the stick were still more inclined, so as to occupy the position EC, then it would appear to approach still nearer to the table; the space included between them would be smaller; and we should say that the angle ECB is smaller than either of the former angles. It is observable that, in this way of considering the subject, the length of the stick, and the length of the table, have nothing whatever to do with the size of the angle; this is a constant rule whenever the size of angles is spoken of.

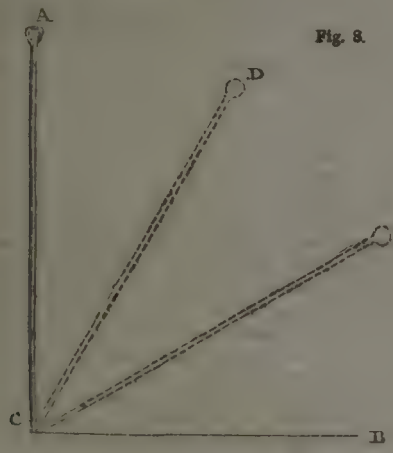


Fig. 8.

As we thus acquire the means of distinguishing a large angle from a small one, we must now inquire what are the means by which two angles admit of being compared with each other. The opening which we have called a right angle, is supposed to be divided into ninety equal parts, called degrees. If the stick were so much inclined, that the opening between it and the table were only one degree, the stick would be almost lying down on the table. If the angle were two degrees, the stick would be a little more raised, and so on, until it became quite upright, when it would form a right angle, or an angle of ninety degrees, with the table. For further convenience, a degree is subdivided into sixty minutes, and a minute into sixty seconds. These divisions are known by the symbols ° ′ ″:—thus, 25° 48′ 50″, implies twenty-five degrees, forty-eight minutes, and fifty seconds.

We shall now find that this mode of proceeding furnishes us with a very convenient method of describing the apparent diameter of the Sun. If a line were drawn from the eye to the top of the Sun, and another line from the eye to the lower part of the Sun, those two lines would be very nearly parallel, or one would nearly lie upon the other. But still they would not do so exactly; and the small space between them would furnish us with an angle to which we could give a value and a name. Now, it is found that two lines so situated, would form an angle of about half a degree: when, therefore, we speak of the diameter of a planet subtending an angle of so many minutes, we mean that, if one line were drawn from one edge, and another from the opposite edge of the object, to the eye, those two lines would form with each other an angle of such dimensions.

The Sun is nearer to the Earth at one part of the year than he is at another, as the Earth's orbit is oval, not circular; and the Sun is in the focus of that ellipse, or oval. When, therefore, the Earth is at that portion of her orbit which is nearest to the Sun, which takes place in our winter, the Sun must obviously appear larger to a spectator on the Earth's surface, than in the summer, when the Earth is further from the Sun: accordingly, it is found that in the middle of Winter, the Sun's diameter is about thirty-two and a half minutes, and at Midsummer about thirty-one and a half minutes of a degree. From the apparent diameters of the sun and planets, their real diameters are easily calculated, when the distances of these bodies are once known.

The apparent dimensions of the Sun, as seen from the other planets, may be thus conveniently expressed by means of the angle, as before described. We shall, however, find it more satisfactory to present in a diagram, (fig. 9,) the comparative dimensions of the Sun, as seen from the different planets:—for instance, if a circle of half an inch in diameter be made, as in the figure below, to represent the Sun as seen from the Earth, then the diameter and apparent size of the Sun, as seen from each of the ten planets, will be as laid down in the diagram. (Fig. 9.)

2. *Luminous effects of the Sun.* What light is we know not! Its cheering, grateful influence, we all feel and acknowledge; but we do not know of what, nor how it is made. From the moment that the Creator made the Sun, "to rule the day," up to the present moment, this Sun has continued to shed a flood of light upon all around: and yet the store is not exhausted: nor is it diminished, so far, at least, as we can tell.

The ancients believed that the Sun was a globe of fire, which constantly darted its beams upon the Earth; but modern science has elicited circumstances, which seem to show that such is not the case. If the Sun be viewed through a powerful telescope, with coloured glasses interposed, to prevent the intense light and heat of the sun from hurting the eye, it will be found that there are numerous dark spots of various forms and dimensions. Some of them are perfectly black, while others have a shaded, or partially-enlightened appearance. These spots, which were first made known to the world by Galileo, about 240 years ago, are subject to much fluctuation: sometimes they appear to expand and enlarge in their dimensions; at other times they seem to contract and become less perceptible. Sometimes they divide into a greater number, while at other times two or more appear to coalesce. Some of these spots have been supposed to be of the immense magnitude of 45,000 miles in diameter; and they have been observed to close up entirely in the space of six weeks; which renders a velocity of a thousand miles per day necessary for the approaching borders of any such spot.

Those parts of the sun's surface which are not occupied by these spots, are still far from uniform in their appearance: they have in many places a mottled aspect, as if numerous pores, or small apertures, were present in the luminous surface. There are, again, other places, which are occupied with luminous vapours and lines brighter than the general surface, and which are called *faculæ;* while the dark spots mentioned before are termed *maculæ.**

From all these circumstances it has been conjectured that the substance or body of the sun itself is really dark or non-luminous; but that he is surrounded with a luminous atmosphere: and that any diminution or removal of such atmosphere at any given point will occasion the dark appearance, which we call a macula. By some it has been

* Maculæ is the Latin for *dark spots;* faculæ, *little torches.*

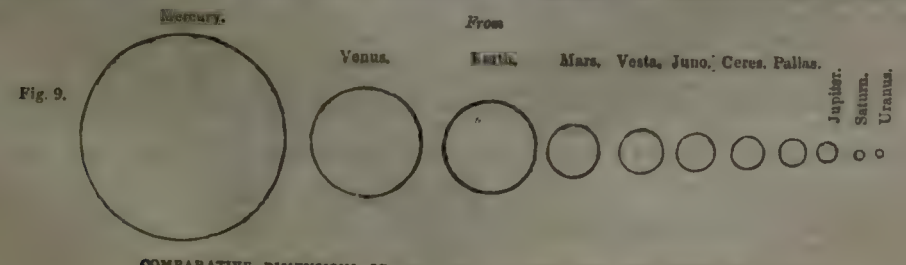


Fig. 9.

COMPARATIVE DIMENSIONS OF THE SUN, AS SEEN FROM THE DIFFERENT PLANETS.

supposed that the black spots are the summits of lofty mountains, which penetrate beyond the luminous atmosphere, and therefore present a dark appearance to the eye. To this it has been objected, that, if such were the case, the sides of the mountain would present a gradation of light, from the black spot at the summit, to the general brilliancy of the sun's surface; whereas, such is not found to be the case. The black spots are in many cases surrounded with *penumbræ*, or partially luminous portions, terminated by distinct and well-defined edges; thereby presenting no appearance of gradation of luminosity.

All these circumstances are considered to lead, more or less directly, to the conclusion, that the Sun owes its brilliantly luminous appearance to an atmosphere which surrounds it; and this supposition is further supported by a very remarkable fact, which the progress of optical science has revealed during the present century. There is often used in experiments in Optics, a three-cornered piece of glass, called a prism, which is oblong, and which if viewed endwise, has a triangular form. When the Sun's rays pass through a piece of glass, or other transparent body of this form, the beam of light is spread out into an oblong form, and is variously coloured,—being red at one end and violet at the other:—the space between being occupied by orange, yellow, green, blue, and indigo. These are the appearances presented under general circumstances; but if this oblong coloured space (which is called the solar *spectrum* *) be carefully viewed with the aid of a telescope, it is found to be crossed by a large number of fine dark lines,—as many, indeed, as 600 in the whole.

Now it is supposed that this is owing to the absorption, on the part of the sun's atmosphere, of some of the coloured rays of light, whereby a black line is given out at those parts of the spectrum which, had the rays in question not been absorbed, would have uniformly contained coloured rays.

Sir William Herschel, who was for many years the Astronomer Royal, supposed that there was an elastic atmosphere surrounding the Sun, composed of a cloudy, or partially visible, stratum of air; and that above this atmosphere was a luminous or light-giving atmosphere. When, from any cause, a portion of the latter atmosphere was removed, a dimly reflected light would be seen on the surface of the cloudy stratum, and thus the faint light or penumbra, is perceived. At any rate, the central part of the sun's disc† appears, notwithstanding the spots and irregular appearances, to be the most luminous. It must, however, be acknowledged that in this, as well as in many other branches of science, we know but little of the real nature of the cause, whose effects we study. Why it is that the Sun differs from almost all other bodies of which we are cognizant in nature, in constantly giving out light without, so far as we know, receiving any light from any other source, is to us a mystery; and cannot fail to excite our admiration,—dependent as we are, for so much that is beneficial to us, on that

> . . . . . prime cheerer, Light!
> Of all material beings first, and best!
> Efflux divine! Nature's resplendent robe!
> Without whose vesting beauty all were wrapt
> In unessential gloom; and thou, O Sun!
> Soul of surrounding worlds! in whom best seen
> Shines out thy Maker! may I sing of thee?

3. *Heating effects of the Sun.* That the Sun is the most prolific source of heat is manifested to us in the grand routine of natural operations. We may warm our apartments by kindling a fire:—we may dress our food by the application of heat, either to the food itself, or to the water in which it is immersed;—and important and indispensable are such processes:—but, if we compare them with the phenomena of the seasons, how humble and trifling do they appear! A fire will convey warmth to but a small space around it, and to but a small number of persons; but how sublime and vivifying is the effect which that seeming "globe of liquid fire," the Sun, produces on the earth! The millions, who inhabit our globe, look to the heating power of the Sun, as the source by which their vegetable productions must arrive at that maturity which will fit them for the purposes of food. What is it which renders the lichens and mosses of the polar regions so different from the luxurious plants of the tropics? It is not the nature of the soil in which they grow; nor the amount of attention which they receive from man:—but it is the extent of the sun's warmth which mainly constitutes the difference referred to. The traveller in tropical climes meets with luxuriant fruits in abundance; while the navigator of the Arctic Seas is seldom cheered, when he touches land, with the sight of vegetation. Many of our readers have probably read Captain Franklin's account of a journey across the northern part of America; when the only food of the party for a considerable period was *tripe de roche*‡, which, though disagreeable in taste, was the only vegetable production which met their view in the course of a toilsome journey.

But we need not go to such extreme cases to instance the value of the Sun's warmth. What constitutes the difference between our own Summer and Winter? What makes the orchard and flower-garden present so different an aspect in Spring and Summer to what they afford in Winter? The Sun's heat is the cause: not that he is present at one season, and absent altogether at the other; but that he is with us longer and under more favourable circumstances, in June than in December. This, however, will occupy our attention hereafter:—we will therefore proceed to make a few remarks on the supposed nature of the Sun's heat.

The light which emanates from the Sun is accompanied by heat in its passage to the Earth and to the other bodies of the solar system; and it is extremely probable from recent inquiries, that light and heat are not the same bodies or agencies, or whatever we may call them. We just now spoke of the passage of light through a glass prism; but we must now consider that same light as being accompanied by heat. It is found that there is more heat at that end of the spectrum which contains the red rays, than at the other end; and it has even been proved that considerable heat exists beyond the limit of the coloured rays; that is, heating rays are found where there are no luminous rays whatever:—this is one of the circumstances which have given rise to the opinion, that the heating or calorific rays of the Sun are distinct from the luminous rays. The investigation of this circumstance was first set on foot by Sir W. Herschel, who, while viewing the Sun's spots through a telescope, protected his eyes by coloured glasses, and found that more heat reached his eye when some colours were employed than with others; and that some of the glasses were cracked by the influence of the heat which they absorbed more readily than those of other colours,—the difference depending on colour. Another reason why solar heat and light are thought to be distinct is, that light has been filtered,—so to speak,—and a brilliant focus of light presented, so devoid of heat, as to be incapable of affecting the most delicate thermometer.

The intense character of the heat evolved by the Sun may be sufficiently shown by the employment of a common burning glass; the action of which is nothing more than this:—all the rays, both of light and heat, which fall on the surface of a lens, are brought into one narrow bundle, by what is called the refracting power of the glass. If, for instance, the glass be one inch in diameter, and we find the focus, which is a little bright spot or image of the Sun formed at a certain distance behind the glass, to be one-tenth of an inch in diameter, then will the light and heat be concentrated 100 times; that is the effects of a certain quantity of light and heat are assembled into a space only one hundredth part of the former space:—from this statement, however, some slight deduction will have to be made, on account of some of the rays being reflected from, and others absorbed by, the glass.

The substance of the Sun is considered to be of a weight and density corresponding to that of water; but, nevertheless, the extent of its bulk is such, that if the weight and density of the whole Earth be regarded as 1, the Sun's weight and density may be set down at 333,000.

Such are the general characteristics of the solar globe. Many other effects, produced by its means, we shall treat of in the proper place. It may be sufficient now to observe, that the action of the Sun's light and heat is the direct source of most of the processes which go on upon the Earth, whether relating to the atmosphere or to the vegetable and animal kingdoms. Pass we on now from the Sun to

* A Latin term implying *an appearance*.

† By the term *disc* is meant the *face* of the Sun or Moon, as seeming perfectly flat; the diameter of which is considered to be divided into twelve parts, called *digits*.

‡ A lichen, which grows chiefly on Alpine rocks, and exposed situations. The Canadian hunters are said to be often forced to subsist upon this vegetable, the leaves of which grow flat upon the rocks; hence it has been called by the natives *rock-tripe*.

MERCURY,

. . . . . whose disc
Can scarce be caught by philosophic eye,
Lost in the near effulgence of his blaze.

We now proceed to the consideration of the bodies which revolve round the Sun, and shall treat of them in the order of their distances, the nearest first.

We should remark, before proceeding further, that the word *planet* signifies a *wanderer;* an appellation given to those heavenly bodies, which seemed to move in circles in the heavens. Hence this distinction may refer both to the planets usually so called, and to their moons; the former of which are styled *primary*, the latter *secondary* planets. Again the primary planets are distinguished into *interior* or *inferior;* and *exterior* or *superior:*—the first pair of terms pertaining to the two planets whose orbits are between the Sun and the orbit of the Earth; the second pair referring to the planets more distant from the Sun than the Earth.

The planet nearest to the Sun, as far as we know for certain, is Mercury; which is somewhat more than 36,000,000 of miles distant therefrom, and is about 3,123 miles in diameter. He revolves on his axis in about 24 hours $5\frac{1}{2}$ minutes, being a little more than the time occupied by the Earth in revolving on her axis. He moves round the Sun in an elliptical orbit, (as we said do all the other planets,) and when we speak of the distance between him and the Sun, it must be understood that we refer to the mean distance. The time which he takes to travel round the Sun is almost 88 days; a period which constitutes his year; for we must bear in mind, as will be hereafter more particularly shown, that our year is nothing more than the length of time which the Earth occupies in going once round the Sun. Hence when we speak of a year as connected with the motion of Mercury, we must remember that his year is different from ours,—the latter being rather more than four times as long as the former.

As he revolves round his orbit of 72 millions of miles in diameter in about 88 days, he has a velocity of motion of about 100,000 miles an hour; a rate of which we can form some conception by considering that 100,000 miles is about four times the circumference of the earth.

As Mercury is so much nearer the Sun than the Earth, it follows that the amount of light and heat received by this planet is much greater than that received by the Earth; and it has been estimated that it is about seven times greater. Another effect of the comparative proximity of Mercury is, that he never appears so far removed from the Sun as the other planets. At no time is he more than 30° distant from the Sun; that is, if, at any time we draw a line from the Earth to the Sun, and another from the Earth to Mercury, those two lines will never form a larger angle than 30°. It is, in part, for this reason that we do not usually speak of Mercury as a morning or an evening star; he never rises much before the Sun, nor does he set much after the Sun: and, in the next place, owing to the proximity of the Sun, by means of which the rays of this planet are, as it were, drowned, we seldom see him at any time. Not but that, in very clear weather, this planet may be seen just before sunrise in the morning, or just after sun-set in the evening, when it appears a good way off from the Sun. His appearance is brighter than that of Venus, and has a light blue tint about it. He subtends an angle of from 5″ to 12″ of a degree, according to his position in respect of the Earth.

There is a circumstance which satisfactorily proves that Mercury does not shine by virtue of any light of his own, but merely by light reflected from the Sun. This circumstance, which also applies to some of the other planets, is the existence of phases*, similar to those which are periodically observed in our moon. When Mercury appears at his greatest distance or elongation from the Sun, his illuminated surface has nearly the form of a half circle, more or less, according to the position of the Earth. But when he is passing round on the opposite side of the Sun to that at which the Earth is situated, the illuminated portion becomes more than a semicircle, and assumes that form which is called *gibbous*; which phase may be represented by placing a semicircle and a semioval with their flat edges in contact. When Mercury is at his greatest distance from the Earth, the Sun is then between them, and shuts out the view of Mercury altogether, so that the whole of the illuminated disc of Mercury can never be seen from the Earth; but when he emerges on the other side of the Sun, he becomes again visible, and his illuminated surface approaches more and more to the form of a semicircle, as he travels on to the position in which he forms a right angle with the Sun and the Earth. As he proceeds in his orbit, he approaches nearer to the Earth, and his semicircular phase becomes diminished to a crescent, which attains its smallest dimensions, when Mercury is either exactly over, or exactly under the Sun; in which position only a few of the Sun's rays, reflected from the surface of Mercury, can reach the earth, and even those few are rendered almost imperceptible by the superior flood of light, which proceeds directly from the Sun to the Earth. These observations apply likewise to the planet Venus.

It is by such evidence as this that we know that a planet does not appear luminous by any inherent light of its own, but that we see it, in consequence of its reflecting the solar light to the Earth. There is every reason to believe that the Earth reflects light from its surface, just as we have described with respect to Mercury; and that if there be inhabitants in any of the other planets, they see the Earth under the various forms of crescent, semicircular, and gibbous. To this conclusion we arrive both by analogy, and by certain appearances of the Moon during a solar eclipse, to which we shall hereafter refer more particularly.

A line drawn from the Earth to the Sun is said to be in the plane of the ecliptic. The ecliptic may be imagined to be a large oval flat surface, which passes through the Sun, and round the edge of which the Earth moves in the space of a year. Now if we suppose a similar, but smaller, oval surface passing through the Sun, and that Mercury passes round the edge of that oval in his year of eighty-eight days, it may be asked whether these two oval surfaces coincide, or whether one slopes with respect to the other? We have to reply that they do not coincide; but that although both of them pass through the sun, they are inclined the one to the other. It will perhaps be desirable here to state that each planet may be conceived to have an oval plane belonging to itself, round the edge of which it passes in the course of its year; and further, that no two of these planes exactly coincide, all of them being inclined one to another. Now the mode of expressing the amount of the inclination, or obliquity of two such planes, is by the angle included between them. Two such planes are said to cut each other in an imaginary line passing through the Sun, which line therefore may be considered as a kind of hinge, connecting the two planes; and the angle, at which these planes are inclined to each other, is measured with reference to that line.

It will now be understood what is meant when we say that the plane of the orbit of Mercury is inclined at an angle of about seven degrees to the plane of the ecliptic, the latter term being always reserved for the plane of the Earth's orbit. If the plane of the orbit of Mercury coincided with the ecliptic, it would follow that Mercury, when at its shortest distance from the earth, would be exactly between the centre of the Sun and the centre of the Earth; and that we should therefore see him as a black spot on the central part of the Sun, which circumstance was first observed by Gassendi in the year 1631. As, however, the planes of the two orbits do not coincide, and yet the planet Mercury is occasionally seen as a black spot on the Sun's disc, the determination of the circumstance, whether or not Mercury will appear on the face of the Sun, depends on the position of the line, which joins the two planes. If Mercury happen to be at his nearest point to the Earth, when he reaches that line, then we shall see him cross the centre of the Sun's disc, in which case the line connecting the two planes will pass through the centres of the Earth, Mercury, and the Sun. But if that line be in any other direction, when Mercury gets between the Earth and the Sun, then he will be either a little above or a little below the centre of the Sun, or more probably, exterior to the disc of the Sun altogether.

From these circumstances it follows that Mercury may revolve many times round the sun, without getting exactly on the line joining the Earth and the Sun. When, however, such an occurrence does take place, it is called a transit† of the planet. At such a time Mercury appears as a small round black spot, because his illuminated surface is directed wholly away from the Earth. He crosses the Sun's disc from east to west, in consequence of his motion from west by south to east. Such a transit as this occurred about the middle of the day on May 5th, 1832. These transits of the

* This is a word from the Greek, and signifies *appearances*.

† From the Latin *transitus, a passing over*.

planets show that they are opaque bodies, having no light of their own.

We must now explain two terms which will be frequently used in our future details; viz. *conjunction* and *opposition*. If we suppose a planet to be exactly between the Earth and the Sun, that planet is said to be in *inferior* conjunction with the Sun: and if the Sun be exactly between this planet and the Earth, the planet is said to be in *superior* conjunction with the Sun; the words *inferior* and *superior* being considered with reference to the smaller or greater distance of the planet from the Earth. This, however, is not all. If the planet be either a little above, or a little below the line which joins the centres of the Earth and the Sun, it is still said to be in conjunction. We shall therefore include all the cases, if we say that a planet will be in inferior conjunction with the Sun, when such planet is the nearer of the two to the Earth; but when the Sun is the nearer of the two, the planet will be in superior conjunction.

Fig. 10.

The term *opposition* is applied to two planets, or heavenly bodies, which are so situated that one particular line, passing through both their centres, will also pass through the centre of the Earth, the Earth being between the other two bodies. This condition can never occur with respect to the planets Mercury and Venus, because their orbits being smaller than that of the Earth, the Earth can never get between them and the Sun, as may be inferred by inspecting the preceding diagram.

The conjunction of one planet with another, or with the Sun, is in most cases a favourable opportunity for distinguishing that planet in the heavens, as we are thus furnished with a clue for detecting its position. The conjunctions and oppositions, as also the risings and settings of the planets, with their precise situations in the heavens, at certain given times, are set down in a species of almanack, devoted to the furnishing of this information, *day by day*, whence it is called an *Ephemeris*. This planet, as to density of matter, is deemed to be nine times that of water, or double the density of the matter of the Earth.

It is sometimes desirable to know when a planet is towards the south, for the convenience of recognising it; but such information is of less value in the case of Mercury than of any other planet, as the proximity of Mercury to the Sun renders it seldom visible. Its time of crossing the meridian, or attaining its southern or most elevated position, varies from about a quarter past ten to three-quarters past one in the day.

VENUS.

With purest ray
Sweet Venus shines; and from her genial rise,
When day-light sickens, till it spring afresh,
Unrivalled reigns, the fairest lamp of Night.

We need not wonder that the poet thus hails the appearance of an object, which attracts so large a share of admiration as the planet Venus, which glitters like a gem in the dark firmament, when the Sun is lighting other parts of the Earth, and which thereby helps to break the gloom which attends upon the sable night.

Fairest of stars, last in the train of Night,
If better thou belong not to the dawn,
Sure pledge of day, that crown'st the smiling morn
With thy bright circlet.—Milton's *Paradise Lost*, b. 5.

No other planet shines with so great clearness and brilliancy upon the Earth as Venus—a circumstance due to her size, but more particularly to her nearness to the Earth. In dimensions Venus approaches much more nearly to those of the earth than any other planet, her diameter being about 7800 miles; so that if we divide the earth's diameter into sixty-six equal parts, the diameter of Venus will contain sixty-five of those parts.

Venus revolves round the Sun in an orbit, which is inclined to the Earth's orbit or ecliptic, the inclination, however, not being so great as in the case of the orbit of Mercury, this latter inclining, as we said, about seven degrees, while the former inclines less than three and a half degrees. Her mean, or medium distance, from the Sun is about sixty-nine millions of miles, nearly twice as great as that of Mercury. This mean distance gives for the circumference of her orbit about four hundred and thirty-three millions of miles, a distance which she travels over in about two hundred and twenty-five days; so that eight of her years are about equal to five of ours. The velocity with which she moves in her orbit is about seventy-five thousand miles an hour, about three-fourths of the velocity of Mercury. Besides the motion in her orbit, she has a rotation on her own axis, which occupies about twenty-three hours and twenty minutes. This rotation is determined by carefully watching the permanent spots on the body of the planet.

The observations which we made about phases, when speaking of Mercury, apply with much more force when referred to Venus, for two reasons;—first, her illuminated surface is larger than that of Mercury,—and secondly, her distance from the Earth is subject to much greater variation than that of Mercury. At her nearest point to the Earth, she is probably about 26 millions of miles distant; but her greatest distance from the Earth is 164 millions of miles.

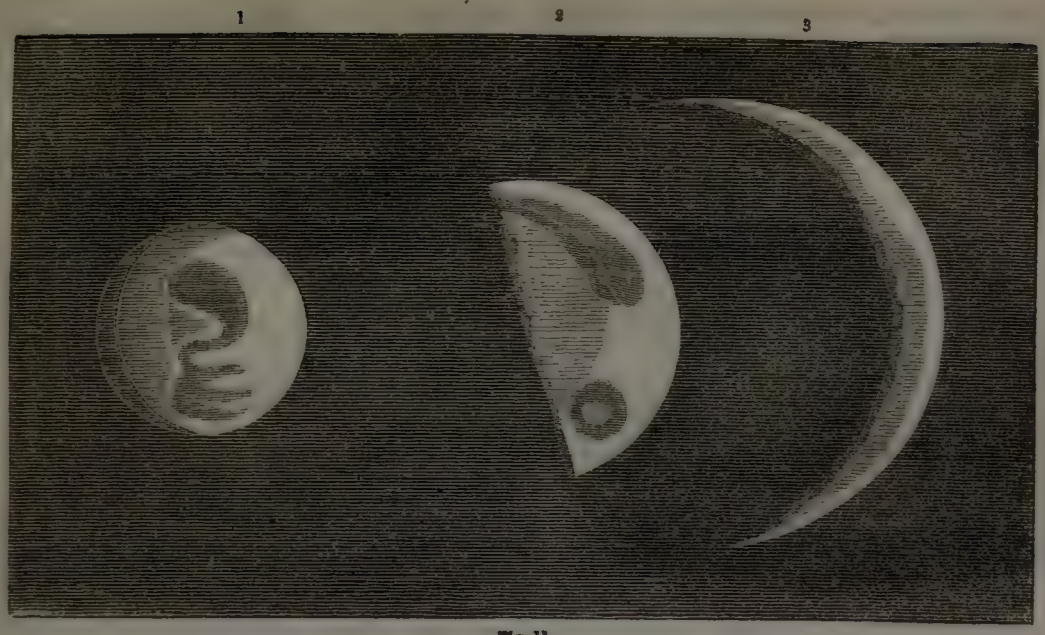


Fig. 11.

It is obvious therefore, that the splendour of her light, and her apparent size must suffer considerable modifications, as well from her varying distance, as from the phases which she exhibits. This is well illustrated in the different figures or phases of this planet, as given above. The first phase, which is the *gibbous*, shows Venus, just after having passed from superior conjunction, and when at almost its greatest distance from the earth; it not being seen when in a line with, or too close to, the sun. The second phase corresponds to our *half-moon*, and is the aspect of Venus when forming a right angle with the sun and the earth; it is then at its greatest elongation. The third phase, or *crescent*, is observed just before and after the planet's inferior conjunction, and when at about its nearest distance to the earth. Hence it has been noticed, as shown in the figure above, that the apparent size of Venus is indicated as greatest by the *crescent* form, and that her light is then most brilliant and abundant; and that her apparent size is least, when in the *gibbous* state, and her light proportionably diminished:—all depending upon her distance from the earth. When Venus gets near to the earth she appears upwards of thirty times larger than when farthest off; and her light about this time is so intense as to project a real shadow upon a white ground, such as clean writing-paper. She may even be seen in the day-time, near, and soon after her greatest elongation. The phases of Venus were first pointed out by Galileo; this being one of his earliest discoveries with the telescope.

Venus, like Mercury, being an inferior planet, cannot, of course, be at any time in opposition to the Sun: indeed, she never recedes farther from him than 47°, which is her greatest elongation, or the angle, which would be formed by two lines drawn to the Earth, one from the Sun and the other from the planet. The orbit of Venus being exterior to that of Mercury, the greatest elongation of Venus, specified by the angle mentioned above, is necessarily greater than that of Mercury; to which circumstance it is owing that Venus is sometimes visible above the horizon for more than three hours before the Sun rises, and upon other occasions for as long a time after the Sun has set:—in the former case she is to the west of the Sun, and is called a *morning star*, and in the latter she is to the east and is designated an *evening star*.* The elongation of a planet refers, then, to that position in which the planet is seen at its greatest distance from the Sun; at which time the planet appears, as we just said, in the shape of a half-moon:—these phases, however, cannot be perceived without the aid of a telescope.

The surface of this planet is found to exhibit spots, similar to those of which we shall hereafter have to speak in the Moon's. By these spots not only the rotation of the planet on her axis has been determined, but the inclination of that axis to the plane of her orbit has been found to be as much as 75° The inclination of the earth's axis to the ecliptic, or path of the earth round the sun, is about 23½°; and this inclination causes the diversity of seasons. How much greater then must be the diversity of seasons on the face of the planet Venus, than on the Earth! Some parts of her surface may enjoy the four seasons twice in the year. The light and heat which she receives from the Sun, is probably about twice as great as that received by the Earth.

We have now to speak of a train of observations, which were productive of important consequences, and in which the planet Venus rendered great service,—we mean the correct calculation of the Sun's parallax; and from that, his distance from the Earth, by means of a transit of Venus across his disc. We have stated that Mercury occasionally crosses the Sun's disc, as viewed from the Earth; and it may reasonably be expected that Venus, being, like Mercury, an inferior planet, would likewise cross the Sun's disc at certain times. Such is the case,—as was first observed by Horrox, a student of Cambridge, in the year 1639; but the transits of Venus occur with much less frequency than those of Mercury. The former happening alternately at intervals of eight and a hundred and thirteen years, nearly. The most celebrated of these transits occurred respectively in the years 1761 and 1769;—celebrated, because many of the European governments sent out scientific expeditions, in order that this phenomenon might be observed at different parts of the Earth, with the greatest accuracy, and under the most favourable circumstances. At the time of the transit, Venus must, of course, be at its nearest position in respect of the Earth, and its apparent diameter will be of the largest extent, which is 61″, or five times that of Mercury. The mean apparent diameter of Venus is about 17″.

The final object, which was more particularly held in view in making these observations was, to determine with greater precision than had been previously done, the distance of the Earth from the Sun; in order that the true magnitude and extent of the whole solar system might be from thence determined. The manner in which this was accomplished does not admit of a full explanation, without entering into more intricate details than are suitable to these papers. We must, however, briefly explain the nature of parallax;—as it was through the medium of this phenomenon that the transit of Venus was rendered available for the object in view; and as the question of parallax is one of the fundamental principles, called into use, in our endeavours to appreciate the distances of the heavenly bodies.

The first step to the accomplishment of the main purpose was to ascertain the parallax of Venus; as a medium point, whereby the solar parallax might be more precisely obtained.

The term *parallax* signifies *a change* produced *by passing by*. Familiarly speaking, we have parallax constantly

* This is the planet which, rising before the sun, the old poets termed Phosphorus and Lucifer; both words meaning *light-bearer*. When setting after the Sun, in the evening, they termed it Hesperus or Vesper; which terms have relation to the *evening*.

taking place: when an object is seen in relation to any other spot, owing to our changing our position. A parallax of the steeple in the following cut takes place, when the observer changes his station of view. When he is in the West, he sees the form of the steeple thrown towards the East: coming up to the foreground he sees it to the North; and, advancing on to the East, he sees the steeple Westward.

Fig. 12.

Now, astronomically speaking, parallax is defined to be the angular distance of any heavenly body between its *true* and *apparent* place; the former being its place, as it would be seen from the centre of the earth, and the latter as it actually appears from any part of the earth's surface. As a heavenly body can only be viewed from the earth's surface, its position is referred to, in calculations, by a necessary allowance, as seen from the centre of the earth, which process is termed *the reduction for the centre.*

In the foregoing diagram this principle is illustrated; as also the following results: that a heavenly body, seen in the zenith, or point in the heavens just over our heads, can have no parallax, because it is seen in a straight line with the centre of the earth; that the horizontal parallax is greatest of all; and that the parallactic angle diminishes in proportion as the celestial body reaches the zenith.

Let A B be the Earth, and C a part of the earth's surface, from whence the heavenly bodies *a b c d* are viewed in the direction of the dotted lines; by which means *a b c d* appear on the heavens at *e i k l*, respectively. Now if the Earth were transparent, a spectator, placed at its centre, would see the four heavenly bodies *a b c d* at *e f g h*, respectively; which would be the *true* places. Hence the *true* place of a heavenly body is somewhat higher than its *apparent* place, excepting as was said before, at the zenith; where the true, and apparent places of objects coincide. The angle formed by the two lines at *b*, *c*, or *d*, is the parallactic angle.

Such then is the nature of parallax: and it will be seen that the horizontal parallax is nothing more than the angular dimensions of half the Earth's diameter, as seen from the planet. With such a planet as Venus, which approaches comparatively near to the Earth, the effect of parallax is considerable; but with respect to the Sun itself, such is not the case; for the Sun, being at the average distance of ninety-five millions of miles from the Earth, the semi-diameter of the Earth must appear exceedingly small, when viewed from such a distance. This small quantity is, however, made more sensible by the transit of Venus over the face of the Sun; for an observer, situated eastward on the Earth's surface, sees Venus begin to pass over the disc of the Sun somewhat earlier than another observer, situated more to the west; and the chord described by the planet upon the solar disc will appear somewhat greater or smaller, according to the situation of the observers upon the Earth's surface. Hence the difference in the position of view gives a difference of time, taken up by Venus in her passage over the sun, which furnishes, by a process which we cannot detail here, an angular quantity, which, after the necessary corrections for the Earth's rotation, and the station of the observers, leads to the horizontal parallax of the Sun; and this is about 8.6 seconds.

In what way this parallax enables the astronomer to determine the distance of a planet, we may briefly explain by referring to one of the properties of the triangle. In the annexed figure, the angle at *d* represents the horizontal parallax of the celestial body *d*. This angle is a known quantity, and so is likewise the line from C to the centre of the Earth, which is half the Earth's diameter, and is about three thousand nine hundred and sixty miles. Now if in any right-angled triangle, such as this is, we know the length of the base, and also the value of the angle opposite to it, we can deduce the length of the sides; by which means we obtain the distance of the planet *d* from the centre of the Earth.

Fig. 13.

Some years ago M. Schröeter, an eminent astronomer of Lelienthal, made a continued series of observations on the planet Venus, for a period of ten years; and his labours led to many remarkable discoveries. He found himself able to determine that there were mountains on the surface of that planet, analogous to those on the surface of the Earth; and that the actual height of some of them amounted to 22.05 miles. Three of them he found to be of the respective heights of 18.97, 11.44, and 10.84 miles. He also perceived evident indications that Venus was surrounded by an atmosphere, which is said to be fifty miles in height.

This planet seems to be composed of matter, which is somewhat denser than the matter of the Earth.

We propose to consider, in our next paper, the subject of the Earth and Moon, with the various circumstances belonging thereto, which are of an astronomical character.

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No. XVI.

AARON AND THE PRIESTHOOD.

ALTHOUGH Jehovah had declared, that if the children of Israel "obeyed his voice and kept his covenant, they should become a kingdom of priests and a holy nation," (Exod. xix. 6,) yet He also consecrated Aaron and his descendants as a sacerdotal caste, to preside over all the ceremonials of public worship. There was nothing in this institution of which the congregation or its princes could reasonably complain. The priesthood formed a hereditary rank, or order, in the land from which they had just departed, as, indeed, it did in most ancient nations; it conferred no political power on the tribe of Levi, on the contrary, it removed them from nearly all interference with civil affairs, because that tribe received no territorial inheritance in the land of Canaan; it did not even give them any peculiar pre-eminence in the eyes of God, for very few of the prophets who spoke by inspiration belonged to the tribe of Levi. It was the purpose of divine wisdom to render the Jews a peculiar people, and this was effected by a rigid and minute prescription of forms; and the maintenance of these forms was entrusted to a hereditary caste, because, humanly speaking, they could only be preserved in their purity by persons accustomed and trained to all their observances from childhood. It was well observed by an ancient philosopher, that "forms are important things, for though they may sometimes exist without the substance, yet the substance can never exist without them;" and the truth of this aphorism is sufficiently shown in the Sacred History; for though the Jews frequently lapsed into idolatry, and thus abandoned the worship of their national God, they did not abandon their national forms, and consequently, when they repented and turned from their dead idols to serve the living God, there was little to change in the outward forms of devotion, and no difficulties arising from novelty to check the process of amendment. On the other hand, the ten tribes after their separation from the kingdom of Judah under Jeroboam, seem to have sunk almost incurably into idolatry, and this lamentable depravity was occasioned not so much from the erection of the golden calves at Bethel and Dan, as from another, and perhaps, in a political view, more important, change, effected by Jeroboam. "He made an house of high places, and made priests of the lowest of the people, which were not of the sons of Levi." (1 Kings xii. 31.) The abolition of the hereditary priesthood rendered the idolatry of the kingdom of Israel incurable, for there was no longer a constituted body which could keep together those who refused "to bow the knee to Baal," or restore the ancient national worship when the Israelites repented of their folly.

The Egyptian priesthood formed an important part of the state; the sacerdotal order was the most influential portion of the political body, and the priestly corporations possessed large estates in land. Even during the seven years of famine, when the regal power was consolidated in Egypt by the prudent policy of Joseph, who rendered the king lord of the soil, we find that the priests were permitted to retain the absolute property of their estates. "Only the land of the priests bought he not; for the priests had a portion *assigned them* of Pharaoh, and did eat their portion which Pharaoh gave them: wherefore they sold not their lands." (Gen. xlvii. 22.) Now, the contrary rule prevailed among the Hebrews, the tribe of Levi inherited no portion of Canaan, and with the exception of Eli and Samuel, we find none of them exercising any control over the public administration in the age of the Judges. This sufficiently refutes the infidel assertion, that Moses borrowed his institution of the Jewish priesthood from the Egyptians, for we find that they were radically different in their essence, and we shall soon see that they were equally dissimilar in their outward forms.

The official dress of the Egyptian priests when offering incense or a solemn sacrifice, was a leopard-skin thrown loosely over the ordinary garments. But the robes worn by Aaron were remarkable for their richness and splendour; the directions given to Moses, (Exod. xxviii.) were,—

Thou shalt make holy garments for Aaron thy brother for glory and for beauty. And thou shalt speak unto all *that are* wise-hearted, whom I have filled with the spirit of wisdom, that they make Aaron's garments to consecrate him, that he may minister unto me in the priest's office.

The word "glory," among the Hebrews, is very frequently used to signify regal splendour, and it is therefore likely that the vestments of the Hebrew high priests were imitated from the royal, and not the sacerdotal robes of Egypt, and that they were in some degree intended to intimate that Jehovah himself was the king of his chosen people Israel.

The priestly vestments of Aaron may be best understood by a reference to the accompanying representation of the Pharaoh Rameses the Sixth, as he is depicted offering incense and libations in his tomb, among the royal sepulchres at Thebes. He was not, indeed, exactly a cotemporary of Moses, but there is good reason to believe that the date of his reign was not long posterior to that of the Exodus. Let us now turn to the vestments directed to be prepared for Aaron:—

These *are* the garments which they shall make; a breastplate, and an ephod, and a robe, and a broidered coat, a mitre, and a girdle: and they shall make holy garments for Aaron thy brother, and his sons, that he may minister unto me in the priest's office. And they shall take gold, and blue, and purple, and scarlet, and fine linen. (Ex. xxviii.)

The word translated *coat*, is in the original *Khetoneth*, which signifies a tunic of fine cotton, similar to the royal vestment called the *Calobium Sindonis**, which is put on English sovereigns during the ceremonial of the coronation, immediately after the anointing; it derives its name from the material of which it was composed, for as we have already shown, the use of cotton or fine muslin dresses in Egypt ascends to the most remote antiquity. Underneath the tunic a pair of loose muslin trousers was worn, and this form of dress is still used by most of the nations of western Asia and northern Africa. The tunic was frequently adorned with stripes of various colours, and in the royal dresses of the Egyptians, we find the very shades which were ordained to be used in the vestments of Aaron.

The robe (in Hebrew *Meil*) was worn over the tunic, like the supertunica or surcoat used at the coronation of English sovereigns. In later times it was furnished with sleeves; but it always hung loose, and it reached from the shoulders to the ancles.

Over the tunic and robe, the high priest wore a vestment which was considered peculiar to the sacerdotal order. It was called, in Hebrew, the *ephod*, and the Greek translators call it the *epomis*, or shoulder-covering. The directions given for its preparation are more minute than those for any other portion of the priestly dress.

And they shall make the ephod *of* gold, *of* blue, and *of* purple, *of* scarlet, and fine twined linen, with cunning

* See *Saturday Magazine*, Vol. XIII., p. 21.

work. It shall have the two shoulder pieces thereof joined at the two edges thereof; and *so* it shall be joined together. And the curious girdle of the ephod, which *is* upon it, shall be of the same, according to the work thereof; *even* *of* gold, *of* blue, and purple, and scarlet, and fine twined linen. (Exod. xxviii. 6—8.)

From this portion of the high priest's dress the use of the *armil*, or stole, in the coronation of English sovereigns. The robe and the ephod were usually adorned with superb fringes, and particular directions are given respecting the ornaments of those which were to be worn by Aaron.

Thou shalt make the robe of the ephod all *of* blue. And there shall be an hole in the top of it, in the midst thereof: it shall have a binding of woven work round about the hole of it, as it were the hole of an habergeon, that it be not rent. And *beneath* upon the hem of it thou shalt make pomegranates *of* blue, and *of* purple, and *of* scarlet, round about the hem thereof; and bells of gold between them round about: a golden bell and a pomegranate, a golden bell and a pomegranate, upon the hem of the robe round about. And it shall be upon Aaron to minister: and his sound shall be heard when he goeth in unto the holy *place* before the Lord, and when he cometh out, that he die not. (Exod. xxviii. 31—35.)

Two remarkable portions of Aaron's dress remain to be mentioned, which are not represented in the figure. The first of these is the breast-plate, respecting which the following directions were given :—

Thou shalt make the breast-plate of judgment with cunning work: after the work of the ephod thou shalt make it: *of* gold, *of* blue, and *of* purple, and *of* scarlet, and *of* fine twined linen, shalt thou make it. Four square it shall be *being* doubled; a span *shall be* the length thereof, and a span *shall be* the breadth thereof. And thou shalt set in it settings of stones, *even* four rows of stones: *the first* row *shall be* a sardius, a topaz, and a carbuncle: *this shall be* the first row. And the second row *shall be* an emerald, a sapphire, and a diamond. And the third row a ligure, an agate, and an amethyst. And the fourth row a beryl, and an onyx, and a jasper: they shall be set in gold in their inclosings. And the stones shall be with the names of the children of Israel, twelve, according to their names, *like* the engravings of a signet; every one with his name shall they be according to the twelve tribes. (Exod. xxviii.)

There is no doubt that a richly-ornamented breast-plate or stomacher was among the chief decorations of an Egyptian king, and it deserves to be remarked that they were generally covered with hieroglyphics, emblematic of the virtues that confer most lustre on a sovereign, such as wisdom, justice, and truth. We have already, (vol. xii., page 60,) shown that the art of engraving on precious stones was well known to the ancient Egyptians, and that some of their engraved signets are among the valuable collection of Egyptian antiquities preserved in the British Museum. The Jews have a tradition to which many allusions are made in the *Talmud*, that it was not the written names, but the crests or cognizances of the twelve tribes which were engraved on these precious stones, a lion for the tribe of Judah, a hind for the tribe of Naphthali, &c., and they believe that these cognizances were hereditary in the tribes from the time of Jacob's remarkable prophecy on his death-bed. This conjecture is certainly very plausible, for among the ancient Egyptians, the forms of animals were adopted as cognizances by the different nomes or provinces; and it is to this very circumstance that the ancient historian, Diodorus Siculus, attributes, if not the origin, at least the prevalence of animal worship in Egypt. Indeed, the phrase "like the engravings of a signet," is much more applicable to symbols than to written names, nor were the Egyptians at this period acquainted with the use of alphabetic writing.

Two extraordinary ornaments of the breast-plate still remain to be noticed. The Lord said to Moses,

Thou shalt put in the breast-plate of judgment the Urim and the Thummim; and they shall be upon Aaron's heart, when he goeth in before the Lord. (Exod. xxviii. 29.)

The word *Urím* signifies *lights*, and the word *Thummím* means *perfections*, or *truths*. Now from the monuments we know that the symbol of the sun was frequently used by the Egyptians to imply the manifestation of celestial light in the material world, and we know that the image of the sun is frequently used in the same sense by the Hebrew prophets; for instance, the Messiah is called THE SUN OF RIGHTEOUSNESS, that is, "the manifestation of righteousness," and hence it seems very probable that by Urím we are to understand some image or symbol of the sun fixed upon the breast-plate of the high priests, just as we find a similar symbol adorning the breast-plate of the kings of Egypt. The will of the Almighty was frequently revealed in some mysterious way by the Urím, for when Joshua was appointed successor to Moses, it enjoined, that

He shall stand before Eleazar the priest, who shall ask *counsel* for him after the judgment of Urim before the LORD: at his word shall they go out, and at his word they shall come in, *both* he, and all the children of Israel with him, even all the congregation. (Lev. xxvii. 21.)

The withdrawing of these responses is also mentioned among the punishments inflicted on Saul, when he had neglected to execute the commands given him by God; "when Saul inquired of the Lord, the Lord answered him not, neither by dreams, nor by Urím, nor by prophets. (1 Sam. xxviii. 6.)

The *Thummím* were symbolic representations of truth; their symbols among the Egyptians were female figures with the eyes closed, holding in their hands the sacred *Tau*, or cross, a religious emblem highly reverenced in Egypt, from the remotest ages.

The mitre of Aaron appears to have been a roll of fine cotton somewhat like a turban, its ornament was very remarkable; "thou shalt make a plate of pure gold, and grave upon it, like the engravings of a signet, HOLINESS TO THE LORD." (Exod. xxviii. 36.) According to the Jewish traditions this inscription was engraved in symbolic, not alphabetic, characters, and could be read only by the high priest. They attributed wonderful powers to a knowledge of the *Shem Hamphorash*, or incommunicable name of God, believing that whoever was acquainted with the true pronunciation of it could work miracles.

Among the Egyptians, as we see from the engraving, which illustrates this chapter, it was lawful for kings to offer incense, but in the Jewish economy this function was strictly confined to the priesthood, and the crime of Korah and his company was their presumption in taking upon themselves to perform so high an office.—"They took every man his censer, and put fire in them, and laid incense thereon, and stood in the door of the tabernacle of the congregation with Moses and Aaron." (Num. xvi. 18.) We find also that the censers were regarded with great reverence, for even those of Korah's company were not allowed to be put to unholy uses.

As the other kings of the East shared the privilege of offering incense with the priests, we find that Uzziah, king of Judah, attempted to intrude himself into the holy office, and was signally punished. (2 Chron. xxvi.)

We have dwelt particularly on these peculiarities of the Jewish priesthood, because it is of importance to show that while the Egyptian monuments confirm the accuracy of the historical records in the Holy Scriptures, they also refute the infidel cavil that Moses derived his institutions from the Egyptian ritual, and not from divine inspiration.

CHAPTERS ON CORONATIONS. No V.

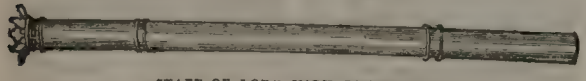
GREAT OFFICERS OF STATE.

The Lord High Steward was anciently the first personage in the realm next to the king. The name of his office is derived from the Saxon words *stead* and *ward*, implying that he is an officer appointed to keep watch in another's stead or place; for on the demise of the crown he acted as viceroy until the king's peace was proclaimed, or, as some authors believe, until the ceremony of the coronation was performed. In consequence of these high functions, he walks next before the king in the procession, bearing, as its temporary possessor, the crown of St. Edward. The office of Lord High Steward was the inheritance of the earls of Leicester, until forfeited to the crown by Simon de Montfort, in the reign of Henry III. Henry having learned by experience that it was dangerous to intrust a subject with such extensive powers, abolished the office as a permanency, and ever since lords high stewards are created only for such occasions as a coronation, or the trial of peers accused of high treason, felony, or misprision of either. During the period of his office the high steward holds a white rod in his hand, and when the ceremony of the coronation terminates, or the trial is concluded, he breaks his staff, to signify that his functions are at an end. If the trial of an indicted peer takes place during the session of parliament, he acts only as speaker or chairman of the court, which is then regarded as the court of our lord the king in parliament. But during the recess this court becomes the court of the lord high steward, and he is the sole judge in matters of law, as the triers are in matter of fact; and as they may not interfere with him in regulating the proceedings of the court, so he has no right to intermix with them in giving a vote upon the trial.

There is likewise a lord steward of the king's household, who is the chief officer of the king's court, has the care of the king's house, and authority over all the officers and servants of the household, except such as belong to the chamber, the chapel, and the stable.

The Stuart family held the office of high stewards in Scotland, but their right merged in the crown, on the accession of Robert II.

The Lord High Constable is next in dignity to the lord high steward, but his office is more ancient, and was at one time more important. His ensign of office is a staff, somewhat like a field-marshal's baton. The name of constable is derived



STAFF OF LORD HIGH CONSTABLE.

from the Latin words *comes stabuli*, which may be translated "master of the horse;" for in the later ages of the Roman empire this dignitary had the government of the army, which then consisted principally of cavalry. Among the French the *comes stabuli* was at first an officer of inferior dignity, but we find that he was sometimes appointed to command military expeditions, and what is rather strange, we find him on one occasion nominated by Charlemagne admiral of a fleet. Philip I. restored the ancient dignity and authority of the constable in France, by appointing him commander-in-chief of all the royal forces. From that time the constable's authority amongst the French became almost unbounded; in the host he was second only when the king was present, and exercised royal power in his absence; he also claimed the custody of the king's sword, as a symbol of his high dignity. In most of the continental kingdoms and principalities, whether of Roman or Northern origin, the constable was one of the most important officers.

In the Anglo-Saxon age an office similar to that of the constable was established in England by the title of Heretoch, but the date of its regular institution must be assigned to the year after the Norman conquest, when William I. conferred the title upon Ralph de Mortimer, and with it the title and estates of Edric, earl of Shrewsbury, who had made a bold attempt to maintain his independence in Wales.

Henry I. made the office hereditary in the family of the earl of Gloucester; it passed in the female line to the Bohuns, earls of Hereford, ten of whom held it in succession. The last of the Bohuns left two daughters, Eleanor, married to Thomas of Woodstock, (afterwards duke of Gloucester,) sixth son to King Edward III., and Mary, married to the earl of Derby, son to John of Gaunt, duke of Lancaster, who afterwards became King Henry IV.

Thomas of Woodstock was, in right of his wife, constituted constable of England during pleasure by his father Edward III., and this dignity was confirmed by his nephew Richard II., who also advanced him to the dignity of duke of Gloucester. The imbecile king finding his uncle too severe a censor of his folly and extravagance, procured his murder. He left one son, Humphrey Plantagenet, who was sent into Ireland by Richard II., and imprisoned in the castle of Trim. He was recalled by Henry IV., who purposed to restore him to his paternal honours, but these intentions were baffled by Humphrey's death; he fell a victim to the plague at Chester, as he was hasting to London. The right to the office of constable passed, by the marriage of his sister Anne, to the family of the De Bohuns, earls of Stafford, and afterwards dukes of Buckingham. The dignity was revived in the person of her great-grandson, who was the principal agent in advancing Richard III. to the throne. He afterwards revolted from Richard, and being taken prisoner, was beheaded on a scaffold in the market of Salisbury. Edward, the son and heir of this unfortunate duke, was restored to all his titles and estates by Henry VII.; but in the thirteenth year of Henry VIII. he was executed for treason, when the office lapsed to the crown, and has not been since revived, except as a matter of form at the coronation.

The office of lord high constable in Scotland was hereditary in the family of the earls of Errol, and the title is retained to the present day though it confers no political or honorary advantages.

The Earl Marshal is next in dignity to the lord high constable, and appears to have been originally, like that officer, a general of cavalry, deriving his name from the German *mare*, which anciently signified a horse, without any distinction of sex, and *schalh*, an attendant. It is probable that the Normans first introduced this title to imply a high military dignity, for when Henry II. undertook the conquest of Ireland he created Henri de Montmorenci marshal of that country. The marshalsy of England appears to have been hereditary in the noble family of De Clare, earls of Strigul or Pembroke, the founders of which are celebrated in the history both of England and Ireland under the name of Strongbow. Isabel, the daughter of Strongbow the conqueror of Ireland, married William Marshal, who was created earl of Pembroke and earl marshal of England. The office passed by marriage into the family of the Bigods, earls of Norfolk, and on the extinction of that family reverted to the crown. Richard II. in the twentieth year of his reign revived the office in favour of Thomas Mowbray, earl of Nottingham, constituting him earl marshal of England. By the extinction of the Mow-

bray family the office of earl marshal again reverted to the crown, and the great inheritance of their house was divided between the Berkeleys and the Howards, both of which were connected with the Mowbrays by marriage. Richard III. in the first year of his reign created John Howard duke of Norfolk and earl marshal of England. But this nobleman, commonly called "Jockey of Norfolk," was slain at the battle of Bosworth field, and attainted after his death. Henry VII. created William Berkeley earl of Nottingham, earl marshal of England, but he died without issue. The office was then given to the king's son, Henry, duke of York, who afterwards became king of England.

Henry VIII. granted the office to Thomas Howard, earl of Surrey, who afterwards became duke of Norfolk. Eleven years afterwards the duke was attainted by act of parliament, and would probably have lost his head, as his son, the accomplished earl of Surrey, did, had not the king died eight days after the act of attainder was passed.

Queen Mary restored the Howards in blood, and the duke of Norfolk, the grandson of the former, became the chief ornament both of her court and that of Elizabeth. He was unfortunately inveigled into conspiracy by Mary queen of Scots, and was beheaded in 1572. In the year 1621 the dignity was again restored to the Howard family, in which it has since continued without interruption.

According to the usages said to have been claimed in the reign of King Henry II. by Gilbert, earl of Strigul or Pembroke, the marshal in right of his office standing next to the king, was entitled to bear in his hand the royal crown, to assist in placing it on the king's head, and, holding it by the fleur de lis fixed in front, to sustain it during the remainder of the solemnity. These claims were never renewed by the subsequent earls marshal

In Edmonson's Heraldry we find the following account of the duties to be performed by the earl marshal. "On the coronation day, and all high festivals, it was incumbent on the marshal to appease and prevent all tumults, noise, and disturbance in the king's presence; to apprehend and keep in safe custody all offenders against the king's peace; to bring them before the high steward, and to take care that justice was done to all persons whatsoever. He was also to keep the doors of the great hall, and of all other rooms within the royal palace, excepting that of the king's bedchamber, and in all things to execute the office of a high usher. For these services he received as his fees the horse and the palfrey on which the king and the queen rode to the place of coronation, together with their bridles, saddles, and caparisons; the cloth spread on the table whereat the king dined; the cloth of estate which hung behind him at dinner; the chines of all cranes and swans served up, and sundry other fees belonging to his high office."

In modern times the earl marshal arranges the order of procession, the precedency of the peers, and the places of the principal officers; he walks next to the high steward, bearing his baton of office, and, together with the lord high constable, introduces the champion at the banquet.

The Lord Chamberlain of Great Britain has a right to livery and lodging in the royal court, and

Earl Marshal's staff.

there are certain fees due to him from each archbishop or bishop, when they do their homage to the sovereign, and from all peers at their creation, or performing their homage. On the morning of the coronation it is his duty to bring the sovereign's principal articles of dress, on which he claims the bed and all the furniture of the chamber for his fee. He also claims forty ells of crimson velvet for his own robes. During the coronation, the lord chamberlain has charge of the coif, linen, and gloves, to be used by the sovereign, the gold to be offered at the altar, and the royal robes; he is also to serve the sovereign with water for washing the hands before and after dinner, and to have the basin and towel for his pains. As governor of the palace, he superintends the preparations in Westminster Hall for the coronation banquet, and he has the nomination of the peer who is to carry the sword of state. Henry I. granted the hereditary enjoyment of this office to the family of the De Veres, earls of Oxford, but it is now attached to the ancient barony of Willoughby D'Eresby.

The lord chamberlain of Scotland had high judicial functions, and his office was hereditary in the Lennox family; it was surrendered to the crown by the duke of Lennox in 1703.

The archbishop of Canterbury has the undisputed right of performing the ceremony of the coronation, and he receives as his fee the purple velvet chair, cushion, and footstool, whereon he sits during the ceremony.

LUNATIC ASYLUMS. TREATMENT OF MENTAL DISEASES.

In an early number of this Magazine*, we called the attention of our readers to the noble establishment at Hanwell, which the magistrates of the metropolitan county had then just finished for the cure and proper management of the Insane Poor of Middlesex. In the course of the last year, that Asylum has been enlarged nearly one third, and has now accommodation for nine hundred patients. The completion of several similar institutions during the last seven years, and the great improvements made in others that are of an older date, and the more enlarged and enlightened views which begin to prevail in the treatment and general management (moral as well as medical,) of those diseases that affect the reasonable manifestations of the mind of man, begin already to tell us, in language the most intelligible, that as yet we have indeed known very little of ourselves, or of what manner of creatures we are.

We have just seen the *Report* for last year of the Lunatic Asylum at Lincoln; an institution that dates not twenty years back, but one which has ever been distinguished for the liberal and enlightened views with which it has been managed, and the zeal which all persons connected with it have shown, in adopting and giving a fair trial to every suggestion that had for its object the happiness and well-being of the unfortunate patients consigned to its cells. A few years ago, the man, however respected or otherwise remarkable for his good sense and discretion, would have been himself declared mad, had he ventured to say or to recommend, that the insane (even the most outrageous,) might be treated in an asylum without the slightest restraint. In the Lincoln Asylum we find that this not only can be, but actually has been done. Their report says,—

The bold conception of pushing the mitigation of restraint to the extent of actually and formally abolishing the practice, mentioned in the last report as due to Mr. Hill, the house surgeon, seems to be justified by the following abstract of a statistical table, showing the rapid advance of the abatement of restraints in this asylum, under an

* See *Saturday Magazine*, Vol. I., p. 104.

improved construction of the building, night-watching, and attentive supervision. We may venture to affirm, that this is the first frank statement of the common practice of restraints, hitherto laid before a British public.

Number of the Patients restrained, and of the instances and hours of Restraint, in eight years and nine months.

Year.	Total number of Patients in the House.	Total number of Patients restrained.	Total number of Instances of restraint.	Total number of Hours passed under restraint.
1829 *	72	39	1727	20,323
1830	92	54	2364	25,458
1831	70	40	1002	13,229
1832	81	55	1401	15,962
1833	87	44	1109	11,992
1834	109	45	647	6,699
1835	108	28	323	2,450
1836	115	12	30	334
1837	130	2	3	28

After deducting the number of patients introduced in the above table more than once in the years 1829-30-31-32-33-34-35, and also the re-admitted cases within the same period, the actual number of patients restrained in the course of such seven years was, 169;—

Of these 169, there remained in the house at the end of such seven years, 43;—

Of these remaining 43, there were discharged from the books during the years 1836-7, *not having been restrained at all* during any part of such two years . 11

——— having been restrained only for about *seven hours* during any part of such two years 2

——— remained in the house December 31, 1837, *not having been restrained at all* during any part of such two years 29

——— having been restrained *once only* (for about nine hours) during any part of such two years 1

* * * * * 43

The erroneous prepossessions of society on the subject of insanity, often lead strangers, while unconsciously surrounded by all the worst cases in this asylum, to inquire where are the furious and violent; and some strangers can with difficulty be induced to believe, that the unoffending, peaceful persons amidst whom they are standing, are the very objects of their inquiry and alarm, subjected to no other control than the habitual presence of steady, watchful, and powerful attendants. The popular belief in the ungovernable ferocity of the insane, encouraged by persons more studious of their own ease and enjoyment than that of the patients intrusted to their care, has been very mischievous, and has tended to excuse restraints and other severities, on the assumption of their necessity; whereas in truth it is this very practice, which renders the complaint intractable, and gives to it a character of exacerbation seeming to justify both the prejudice and the treatment. Such prejudices and their consequences can only be corrected, by opening examples of a milder management to the inspection of society, which has a deep personal concern in the mild or harsh treatment of a complaint, which may affect *any*, either personally or through relatives and friends.

During the period when restraints were so freely resorted to in this and other asylums, it could be little imagined by strangers permitted to see the condition of only a selected portion of the patients, exercising or engaged in the beautiful foregrounds, or in some of the cheerful galleries in front, that behind this scene were lingering under restraints such a large proportion of the patients. The public has generally seen what it is least important that they should see.

Under the able direction of Dr. Charlesworth, (who may be called the founder of this asylum, for though a public it is not a county asylum,) and the sound judgment and admirable management of Mr. Hill, what has been accomplished at Lincoln may be done in every asylum in the empire, but not where any one man, how distinguished soever he may be for talent and experience, arrogates to himself the power of watching the tempers, dispositions, and frailties, of a thousand of his fellow creatures.

* From March 16th.

PUBLIC PROCESSIONS OF QUEEN ELIZABETH.

No. VIII.

PROCESSION FROM THE TOWER TO WESTMINSTER THE DAY BEFORE HER CORONATION.

In our last paper on this subject we left Queen Elizabeth at the "nether ende of Cornehill," where she was entertained with an ingenious pageant representing the triumph of certain virtues over their antagonist vices, the ground of it being that like as by virtues, ("whych," as our chronicler parenthetically observes, "doe aboundantly appere in her grace") the queen's majesty was established in the seat of government, so she would set fast in the same so long as she embraced virtue, and held vice under foot. "For if vice once got up the head, it would put the seate of government in peryll of falling."

Leaving Cornhill the queen proceeded on her way, and entering Cheapside, passed the Great Conduit in Cheapside, which was "bewtified with pictures and sentences," and on reaching Sopar Lane was entertained with a third pageant. Three stages were erected, and upon them sat eight children, representing as the title written in front declared, *The Eight Beatitudes expressed in the v. chapter of the Gospel of St. Matthew applyed to our Soveraigne Lady Quene Elizabeth.* Every child was "appointed and apparelled according unto the blessing which he did represent;" and had over his head a tablet bearing its name. There were four of the children on the lowest stage, three on the next, and one on the uppermost. As usual, "prety sayinges," appropriate to the subject, were scattered about; and over the two side gates was placed "a noyes of instruments." In front was a standing place for a child, who, when Elizabeth came up, addressed her in the following words, "The Quene's majestie geving most attentive care, and requiring that the people's noyse might be stayde:"—

Thou hast been viii times blest, O Quene of worthy fame,
By mekeness of thy spirite when care did thee besette,
By mourning in thy griefe, by mildnes in thy blame,
By hunger and by thyrst, and justice couldst not gette.

By mercy shewed not felt, by cleanes of thyne harte,
By seking peace alwayes by persecucion wrong,
Therefore trust thou in God, since he hath helpt thy smart,
That as his promis is, so he will make thee strong.

When this address was finished, all the people wished, "that as the child had spoken, so God woulde strengthen her grace against all her adversaries;" and the Queen's Majesty after most gently thanking them for their so loving wish, passed forwards. At the Standard in Cheapside, which was "dressed fayre" for the occasion, were trumpets with banners and other decorations; and the Cross was likewise "made fayre and well trimmed." And "neare unto the same, uppon the perche of Saint Peter's church door, stode the waites of the citie, which did geve a pleasant noyse with their instruments as the Quene's Majestie did passe by;" while her grace on every side casting her countenance, wished well to all her most loving people. Soon after passing the Cross, she espied at the upper end of Cheapside the pageant erected at the Little Conduit, "and incontinent required to know what it might signifye. And it was told her grace that there was placed Tyme. *Tyme?* quoth she, *and Tyme hath brought me hether.*"

As the queen advanced to the Little Conduit at the upper end of Cheapside, she came to the spot where the aldermen were stationed. All the way from Fenchurch up to this point, the streets had been lined by the different city companies,—

One by another, enclosed with rayles hanged with clothes, and themselves well-apparelled with many riche furres, and their livery whodes uppon their shoulders in comely and seemely manner, having before them sondry persones well-apparelled in silkes and chaines of golde, as wyfliers and garders of the sayd companies, beside a number of riche hanginges, as well of tapistrie, arras clothe of golde, silver, velvet, damaske, sattin, and other silkes, plentifullye hanged all the way.

And from the windows and penthouses of every dwelling, were hung a number of rich and costly banners and streamers.

When the Queen came to the upper end of Cheapside where the aldermen were placed, the "right worshipfull maister, Ranulph Cholmeley," the city recorder, presented by appointment to her Majesty, a purse of crimson satin, richly wrought with gold, and contaming a thousand marks in gold. "Maister Recorder" briefly addressed her Majesty, his words tending to this end, that the lord-mayor, his brethren and commonalty of the city, in order to declare their gladness and goodwill towards the Queen's Majesty, did present her grace with that gold, desiring her grace to continue their good and gracious Queen, and not to esteem the value of the gift, but the mind of the givers. The Queen with both her hands took the purse, and answered the recorder "merveylous pithilie,—and so pithilie, that the standers by as they embraced entierly her gracious aunswer, so they mervailed at the cowching thereof, which was in wordes truely reported these."

I thank my lord-maior, his brethren, and you all. And wheras your request is that I should continue your good Ladie and Quene, be ye ensured that I will be as good unto you as ever Quene was to her people. No wille in me can lacke, neither doe I trust shall ther lacke any power. And perswade yourselves, that for the safetie and quietnes of you all, I will not spare, if need be, to spend my blood. God thanke you all.

This answer * of so noble hearted a princess, moved a marvellous shout and rejoicing, "since both the heartines thereof was so woonderfull, and the woordes so joyntly knytte;" and the Queen moved forwards to the Little Conduit, where was erected a pageant "with square profucion standynge directlye before the same Conduite with battlementes accordinglye." This pageant was one of the most remarkable. Two hills or mountains were raised of a convenient height. That on the north side was made cragged, barren, and stony; and on it was fixed a tree artificially made, "all withered and deadde, with braunches accordinglye." Under this tree, at the foot thereof, sat one in an homely and rude apparel, in a bending posture and mourning manner; over his head was fixed a tablet, on which was written his name in Latin and English—"Ruinosa Respublica"—"A decayed Commonwealth." Upon this same withered tree were fixed tablets, on which were written proper sentences expressing the causes of the decay of a commonwealth; thus,—

Want of the feare of God.	Civill disagreement.
Disobedience to Rulers.	Flattring of Princes.
Blindnes of Guides.	Unmercifullnes in Rulers.
Briberie in Majestrats.	Unthankfullnes in Subjectes.
Rebellion in Subjectes.	

In perfect contrast to this hill was its southern neighbour, thus described.

The other hylle on the south syde was made fayre, freshe, grene, and beawtifull, the grounde thereof full of flowers and beawtie: and on the same was erected also one tree, very freshe and fayre, under the whiche stoode uprighte one freshe personage, well apparayled and appointed, whose name also was written both in Englyshe and Laten, which was 'Respublica bene instituta,' 'A Flourishing Commonwealth.' And uppon the same tree, also, were fixed certayne tables conteyning sentences which expressed the causes of a flourishing common weale.

The sentences here spoken of were these:—

Feare of God.	Obedient Subjectes.
A wise Prince.	Lovers of the Commonweale.
Learned Rulers.	Vertue rewarded.
Obedience to Officers.	Vice chastened.

In the middle space between the two hills, was an artificial cave with a door and lock. Out of this cave, shortly before the Queen's coming up, issued a personage whose name was Time, apparalled as an old man, with a scythe in his hand, and wings artificially made. He led forth a personage of smaller stature, finely apparalled, being "all cladde in whyte silke," and having over her head her name and title in Latin and English, thus: "Temporis filia,"—"The daughter of Time." On the breast of the damsel, however, was "her propre name," *Veritas*, or Truth; and in her hand she held a book on which was written *Verbum Veritatis*, or the Word of Truth.

These two personages, Old Time, and his daughter Truth, having issued from the cave as the Queen approached, betook themselves to the south side of the pageant, or the hill of the flourishing commonwealth; and when her Majesty came up, a child stationed in the same quarter thus addressed her:—

This olde man with the sythe, olde father Tyme they call,
And her his daughter Truth, which holdeth yonder boke;
Whom he out of his rocke hath brought forth to us all,
From whence this many yeres she durst not once out loke.
The ruthful wight that sitteth under the barren tree,
Resembleth to us the fourme when common weales decay,
But when they be in state tryumphant, you may see
By him in freshe attyre that sitteth under the baye.
Now since that Time again his daughter Truth hath brought,
We trust, O worthy Quene, thou wilt this truth embrace;
And since thou understandste the good estate and nought,
We trust wealth thou wilt plant and barrennes displace.
But for to heale the sore and cure that is not seene,
Which thing the boke of truth doth teache in writing playn:
She doth present to thee the same O worthy Quene,
For that, that wordes do flye but wryting doth remayn.

When the child had ended this speech, he handed towards the Queen the Book of Truth, which shortly before, Truth had let down to him by a silken lace; Sir John Parrat, one of the knights who supported the royal canopy, received the book and delivered it to her Majesty. This book was the Bible in English, and Elizabeth received the offering as it became her; she kissed it, "and with both her hands held up the same and so laid it upon her brest with great thankes to the citie therfore." The matter of this pageant "dependeth of them that went before," according to our authority.

For as the first declared her Grace to come out of the house of unitie, the second that she is placed on the seat of government staied with Vertue to the suppression of Vice; and therefore on the third the eight blessings of Almighty God might well be applyed unto her; so this fourth now is to put her grace in remembrance of the state of the commonweale which Time with Truth his daughter doth revele, which Truth also her grace hath received, and therefore cannot but be mercifull and careful for the good government thereof.

From the Little Conduit at which this pageant had been erected, and which stood near the top of Cheapside, the Queen passed into St. Paul's Churchyard; and "when she came over against Paules Scole, a childe appointed by the scolemaster thereof pronounced a certein oration in Latin and certein verses." The bulk of the oration was a panegyric upon Elizabeth, whom it described as a sovereign such as former times had never seen, and later times were not very likely to see. All Britain, it said, should rejoice,

* "The answer which her grace made unto Maister Recorder of London, as the hearers know it to be true, and with melting hearts heard the same: so may the reader thereof conceive what kinde of stomacke and courage pronounced the same."

having now attained that state of happiness which the philosopher Plato had declared to be the lot of a commonwealth whose ruler was adorned with virtues and eager in the search after wisdom. The beauties of her grace's person were declared to be so palpable as not to need description; and as for the endowments of her mind, those were such that no powers of language *could* describe them. Under her sway piety would prevail; England would flourish, and the golden age would return; wherefore her subjects should render unto her all honour. The oration concluded with a prayer that her highness might live as long as that sage of antiquity, Nestor, and become a happy mother.

When the child had finished, he kissed the oration "which he had there faire written in paper," and delivered it to the Queen; and her Majesty who had listened most attentively while it was being pronounced "most gently received the same." She then proceeded towards Ludgate and was there received with a noise of instruments, "the forefront of the gate being finelie trimmed up against her majesties comming." Thence she went down to Fleet-bridge; and in this part of her passage some one about her "noted the cities chardge," and drew her attention to the circumstance that no cost had been spared. Her grace thereupon replied that she did well consider the same and that it should be remembered. "This," says our contemporary chronicler, Is an honourable answere, worthie a noble prince which may comforte all her subjectes, considering there can be no point of gentleness or obedient love shewed towarde her grace, whych she doth not most tenderlie accepte, and graciously waye.

At the Conduit in Fleet-street was the fifth and last pageant "in forme following:"

From the Conduite, which was bewtified with painting, unto the north side of the strete, was erected a stage, embattelled with foure towres, and in the same a square platte rising with degrees, and uppon the uppermost degree was placed a chaire, or seate royall, and behynde the same seate, in curious and artificiall maner, was erected a tree of reasonable height, and so farre advaunced above the seate as it did well and semelye shadow the same, without endomaging the syght of any part of the pageant; and the same tree was bewtified with leaves as greene as arte could devise, being of a convenient greatness, and conteining therupon the fruite of the date, and on the toppe of the same tree in a tablet was set the name thereof, which was, "A palme-tree;" and in the aforesaide seat, or chaire, was placed a semelie and mete personage, richlie apparelled in parliament robes, with sceptre in her hand, as a quene, crowned with an open crowne, whose name and title was in a table fixed over her head, in this sort; "Debora the judge and restorer of the house of Israel, Judic iv." And the other degrees, on either side, were furnished with six personages; two representing the nobilitie, two the clergie, and two the comminaltye. And before these personages was written, in a table, "Debora, with her estates, consulting for the good government of Israel." At the feete of these, and the lowest part of the pageant, was convenient rome for a childe to open the meaning of the pageant.

When the Queen reached this pageant and saw the child "readie to speake," her grace required silence, and commanded that her chariot should be drawn nearer, "that she might plainlie heare the childe speake, whych said as hereafter foloweth:"

Jaban of Canaan king had long, by force of armes,
Oppressed the Israelities, which for God's people went:
But God minding at last to redresse their harmes,
The worthy Debora as judge among them sent.
In war she, through God's aide, did put her foes to fright,
And with the dint of sworde the hand of bondage brast.
In peace she, through God's aide, did alway mainteine right;
And judge Israell till fourty yeres were past.

A worthie president, O worthie quene, thou hast
A worthie woman judge, a woman sent for staie.
And that the like to us endure alway thou maist,
Thy loving subjectes will with true hearts and tongues praie.

The "voide places" were filled with "pretie sentences" concerning the same matter. And the ground of the pageant was this, that as the one preceding had set before her grace's eyes the flourishing and desolate states of a commonwealth, she might by this be put in remembrance to consult for the worthy government of her people;

Considering God oftimes sent women nobly to rule among men; as Debora whych governed Israell in peas the space of xl years, and that it behoved both men and women so ruling to use advise of good counsell.

Our engraving represents a procession through Cheapside in the reign of Charles the First; and exhibits that thoroughfare in probably the same state as in the reign of Elizabeth. On the extreme left of the view is the "Nag's Head," an inn which formerly stood at the corner of Friday Street. In the centre, nearly opposite Wood Street, stands the Cross, which was destroyed in the Great Rebellion.

ANCIENT PROCESSION THROUGH CHEAPSIDE, WITH A VIEW OF THE CROSS

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THE WYE AND MONMOUTHSHIRE. No. III.

WILTON CASTLE.

BRADWARDINE—KENCHESTER—HEREFORD—MARCLAY HILL—SELLACK—ROSS—MAN OF ROSS—WILTON CASTLE.

Morn crimsons o'er the hills, while far below,
Half lost in woods, half gleaming to the pale
Of twilight, Vaga's wizard waters flow
Reluctantly through yon Elysian dale—
Soft image of some happier world.

In journeying onwards to Hereford, many pretty villages greet the eye of the traveller as he follows the course of the river. The country which, after leaving the Hay, is fertile and well cultivated, on approaching *Bradwardine* assumes a bolder aspect, and among the various eminences, *Mirebich Hill* rises prominently in the fore-ground. The Wye, at Bradwardine, is luxuriantly adorned with wood. A castle which formerly stood here is said to have been the residence of the family of Bradwardine; Thomas, one of whom, was archbishop of Canterbury in the time of Edward the Third, but this is considered doubtful. *Brobury's Scar*, a bold and majestic cliff rising on the north bank of the river, affords a splendid contrast with the adjacent scenery upon its banks. *Moccas Court* is delightfully situate upon elevated ground on the southern bank, and many other beautiful villas embellish the landscape in the vale of the Wye before the traveller reaches Hereford. Golden Vale, or *Driffin Dwr*, through which runs the Dour, a tributary of the Monnow, which joins that river near Grosmont, in Monmouthshire, is a scene of "fairy land;" and as it lies in the immediate neighbourhood, a visit to it should by no means be omitted. The part of the country eastward of the vale towards Hereford, is called Archenfield.

Kenchester, situated on a small river called the Ine, which runs into the Wye at Hereford, is the supposed site of the ancient city Ariconium, where King Offa had a palace. In Leland's time the place was overgrown with brambles and brush-wood. Many large foundations and various remains of Roman masonry brought to light from time to time, attest its ancient splendour and magnificence. In 1679 a Roman brick vault was discovered, and the following year Sir John Hoskyns found a bath about seven feet square, with leaden pipes entire. A Roman encampment called *Magna Castra*, is in the immediate vicinity. The destruction of Ariconium, which is absurdly attributed to an earthquake, has been well described by Philips, in his poem called *Cider*.

About a mile from Hereford, stands the hexagon shaft of a stone cross, about fifteen feet in height, called White Cross. It is supposed to have been erected by Lewis Charlton, bishop of Hereford, in the year 1345, in commemoration of an infectious distemper then raging in the city, which caused the inhabitants to hold their markets here.

The city of Hereford is pleasantly situated on the left bank of the Wye, nearly in the centre of the county. The name is said to signify the ford of an army. The Welsh call it *Hen-fordd*, or the old way; and Trefawith, signifying the beech-trees. Camden informs us that the Saxons called it Fernlay, and held it as a military station. Hereford was in former days surrounded with walls and a ditch; and defended by a magnificent castle, of which, however, there is now no trace: the earth-works of the outer ward have been converted into pleasant walks for the use of the inhabitants.

There is an air of tranquillity—an "old world character" about Hereford, which is refreshing to the wayfarer from crowded cities, and attributable to the absence of manufactures and the sombre aspect of its ancient buildings. Cider, grain, oak-timber, &c., are occasionally conveyed down the river in barges to Bristol and elsewhere, when the water is sufficiently deep to allow vessels to pass over the shallows; and by the same mode of conveyance coals are brought up from the Forest of Dean and Chepstow. Some of the streets are wide, but the houses in general are not remarkable in an architectural point of view. Of the "six noble gates" mentioned by Leland, there is not a trace remaining. The principal ornament of the city is its aged cathedral, with which the readers of the *Saturday Magazine* are already acquainted*. There were formerly five churches besides the cathedral, two of which were destroyed during the civil war in 1645, by the Scotch forces during a siege. The old Roman Catholic chapel in the Broad Street has lately been pulled down, for the purpose of erecting on its site "a large and handsome Catholic church."

Two hills in the neighbourhood, Dinedor and Acornbury, are worth visiting; especially the latter, which, in addition to the remains of a fine Roman camp on its summit, embraces a view of Hereford, and an extensive and beautiful prospect.

The Wye at Hereford, Mr. Roscoe playfully observes, "looks placid and smooth,—the beautiful romping hoiden of Plynlimmon, tamed down into a quiet *douce damosel*." In its course onwards to Ross, it meanders through a rich undulating country, pronounced "tame" by Gilpin, but affording one of the most beautiful examples we are acquainted with of thoroughly English scenery; orchards and hop-grounds, smiling villages and hallowed fanes, (Herefordshire is renowned for its spires,) green knolls and wooded hollows.

Near the junction of the Lug (in which there is excellent trout and grayling fishing) with the Wye, six miles below Hereford, is Marclay Hill, which, "in the year 1557," Camden says, "did for three days together shove its prodigious body forward, with a horrible roaring noise, and overturning everything in its way, raised itself to the great astonishment of the beholders to a higher place." It is also stated by another old writer, who probably alludes to the same event, that in the year 1575, "many acres of Marclay Hill gave way and separated from the rest, leaving a gap four hundred feet long, and three hundred and twenty feet wide, overthrowing Kinaston chapel and several other houses in its fall." On a well-wooded hill, called Woldbury, from whence is an extensive prospect, are the highly interesting traces of an ancient camp, double trenched and nearly half a mile long. Sellach church is of singular construction, and the east window is beautifully ornamented with stained glass, bearing the date of 1630. A fine old *British highway* runs down from the church to a ford on the river. About a mile below Ingeston, on Eaton Hill, is another of those ancient hill-fortifications, which form a regular chain in this part of the country; the intrenchments are very deep and perfect. At *Abnot* there is a very beautiful view of Ross, with its "heaven-directed spire." This neat comfortable-looking, little town, celebrated for the good deeds of honest John Kyrle, the "Man of Ross," whose spirit still seems to pervade the whole locality, and well known as the point of embarkation for the lower Wye tour, is situated on a ridge or promontory, overhanging the river, which gently winds below through a rich and well-cultivated country.

The first object to which the stranger directs his attention at Ross is the venerable church, which is admirably situated, and in an excellent state of preservation. Its general, fine effect is owing to its lofty, well-proportioned spire, and a belt of stately elms, planted in 1685 by John Kyrle, whose useful and honourable life we have already recorded*. The east window is tastefully adorned with stained glass, which reflects "a dim religious light" on the surrounding mementos of departed worth. The great bell of the church, which bears the name of John Kyrle, was cast at Gloucester in 1695, at the expense of that excellent individual. It is said that he attended there himself on the occasion, and taking with him his old silver tankard, after drinking the sterling old toast of "Church and King," he threw it in, and had it cast with the bell. In the east window of the north aisle, in the interior of the church, two slender young elms spring from the roots of one of the original trees planted by Kyrle. There is a legend about these trees, which, whether true or not, is so singular and touching that we cannot pass it over. It is said that after the death of their planter, a rector cut down some of the trees facing the pew of honest John Kyrle, and that immediately afterwards several shoots sprang up from their roots, which, penetrating through the walls of the church, formed a graceful and verdant drapery over the seat of the beneficent old man. These trees, which we trust will be suffered to flourish unmolested, are regarded by the inhabitants with feelings of almost superstitious reverence. The pew where Mr. Kyrle sat for so many years remains precisely as it was at the time of his decease, although the church has undergone various alterations and repairs since that period. There is a fine and extensive bird's-eye view from the "Prospect," or the "Man of Ross's Walk," adjoining the churchyard. Gray and Gilpin, however, speak disparagingly of it. The former says, "I find all points that are much elevated spoil the beauty of the valley, and make its parts, which are not large, look poor and diminutive." Ross is a rural deanery; the rectory and vicarage were consolidated by an act of the legislature in the reign of Charles the Second.

The unfortunate Charles the First slept at Ross in 1645, on his way from the princely castle of Ragland, at that time garrisoned by the followers of that devoted and loyal servant of the martyred monarch, the Marquis of Worcester. A house in Church-lane, called "Gabriel Hill's Great Inn," contains the old chamber where the king slept; now, however, it is divided into two. A small piece of the oak bedstead

* See Vol. V., p. 74.

* See *Saturday Magazine*, Vol. I., p. 164.

on which the king is reported to have lain, is preserved at the Blue Coat School House. There is little else to interest the antiquary in Ross.

The most easy, and perhaps the most pleasant mode of prosecuting the Wye tour from Ross, is to descend the river in one of the numerous and comfortably-fitted boats kept there for the purpose. The tourist, however, can thus only obtain a general idea of the scenery, without that acquaintance with its details, which so greatly enhances the interest of an excursion of this sort. For ladies, of course, this is the only plan to pursue; but to such as are able to "rough it," a pedestrian tour is decidedly preferable, as there are many interesting objects worthy of a visit on either side of the river, as well as in the neighbourhood, which can only be seen by this method;—there is yet a still better plan, and that is to *ponyize*, for as Sir Richard Colt Hoare very justly observes,—

A man on a pony has a far better chance of minutely noticing an object than a wearied pedestrian, whose thoughts, nature in exhaustion, must unavoidably direct to his dinner and his bed.

The first part of the river after leaving the town, is once more spoken of by Gilpin as "tame," but, he adds, "some relief is afforded by the Man of Ross's walk, a plantation of forest trees on the brow of a rocky eminence, and the back view of Penyard and the Chase Woods at the Weir-end." After crossing Wilton Bridge, a somewhat curious and antique structure, the small village of Wilton presents itself, and on the right bank of the river above the bridge, stand the ivy-mantled and crumbling relics of Wilton Castle, which was burnt to the bare walls by the Royalists during the civil commotions in the reign of Charles the First, in the absence of its then possessor Sir J. Brydges. It afterwards came into the hands of that excellent individual Thomas Guy, who founded the hospital which bears his name in London*, and bequeathed the Wilton estate to that charitable institution.

The Wye scenery, after leaving Wilton, gradually improves;—the lofty banks on either side are richly covered with wood, and the stream winding abruptly round several grand woody promontories, displays to the lover of nature fresh scenes of quiet beauty. Gilpin observes, at this spot, "The channel of no river can be more decisively marked than that of the Wye.—*Who hath divided a water-course for the flowing of rivers?* saith the Almighty, in that grand apostrophe to Job on the works of the creation. A nobler *water-course* was never *divided* for any river than this of the Wye."

* See *Saturday Magazine*, Vol. V., p. 42.

During the Rebellion in 1745, Alexander Macdonald, of Kingsburgh, was so involved in the escape of Prince Charles that his destruction seemed certain, and he was brought prisoner to Fort Augustus. During his confinement in the fort, an order came for the release of several prisoners. Amongst those who were to be released, the officer called the name of Alexander Macdonald, and asked Kingsburgh if that was not his name. "That is my name," said he; "but I suspect there is some mistake." "What do you mean," said the officer; "is not that your name?" "Yes, certainly," said Kingsburgh, but still warned the man there must be some error: at last he went out. He met a friend, who advised him to leave the place instantly. "No," said Kingsburgh, "I must stay and see if the officer does not get into a scrape; I shall go to that public-house opposite." In about two hours a body of soldiers came, with an order to arrest the officer on guard, for having let so dangerous a prisoner at large. Kingsburgh instantly ran across the street, saying to the officer, "I told you there was some mistake." The President Forbes, however, saved this noble-minded man's life.

CORONATION ANECDOTES. No. V.

Henry IV.

Henry IV. was crowned by Archbishop Fitzalan on the 13th of October, 1399, and on this occasion the Ampulla, whose legend we have before mentioned, was first employed. The king's second son Thomas, as lord high steward, presided in the Court of Claims, and it is chiefly from the record of his decisions that subsequent controversies respecting claims of service have been decided. After Henry had gone to the Tower, he created forty-six knights of the Bath, among whom were three of his own sons. The procession from the Tower to Westminster was unusually splendid, no less than six thousand horses having been employed on the occasion. Some difficulty appears to have arisen from Henry's defective title, and by the advice of his friends he added to his claim that he had been adopted heir by King Richard. This falsehood was introduced to set aside the superior titles of Edmund Mortimer, earl of March, and Richard, earl of Cambridge, in right of whom the house of York subsequently claimed the crown, and this gave rise to the wars of the Roses.

Jane, queen of Henry IV., was crowned in the year 1403, but the ceremony was not remarkable for its brilliancy or splendour.

Henry V.

Henry V. was crowned on the 9th of April, 1413. Holinshed informs us, "Such great hope, and good expectation, was had of this man's fortunate successe to follow, that within three daies after his father's deceasse, diverse noblemen and honorable personages did to him homage, and swore to him due obedience, which had not beene seene doone to anie of his predecessors, kings of this realme, till they had beene possessed of the crowne. He was crowned the ninth of April, being Passion Sundaie, which was a sore ruggie and tempestuous day, with wind, snow, and sleet, that men greatlie marvelled thereat, making diverse interpretation what the same might signifie." Hardyng mentions this tempest in his rhyming chronicle:

> On Passyon Sundaye after was this kyng,
> Anoynted and crowned without taryeng,
> The ninth daye it was of Apryll so
> With stormes fell and haylstones grete also.

Katherine of France, the queen of Henry V., was crowned on the 24th of February, 1420; the account which Holinshed gives of the magnificence displayed upon this occasion, is far too characteristic of the age to be omitted. "It is worth the noting, to consider and take a view of the goodlie order and reverend dutifulnesse exhibited on all sides to the new queene. .... After the great solemnization of the foresaid coronation in the church of St. Peter, at Westminster, was ended, the queene was conveied into the great Hall of Westminster, and there set to dinner. Upon whose right hand sat, at the end of the table, the archbishop of Canterbury, and Henrie, surnamed the Rich, cardinall of Winchester. Upon the left hand of the queene sat the king of Scots in his estate, who was served with covered messe, as were the foresaid bishops, but yet after them. Upon the same hand and side, neat the boord's end, sat the duchesse of Yorke and the countesse of Huntington. The earle of March, holding a scepter in his hand, kneeled upon the right side; the earle marshall, in like manner, upon the left of the queene. The duke of Glocester, Sir Humfre,

was that daie overseer, and stood before the queene bareheaded. Sir Richard Nevill was that daie carver to the queene, the earle's brother of Suffolk cupbearer, Sir John Stewart sewar, the Lord Clifford pantler, in the earle of Warwicke's steed, the Lord Willoughbie buttler, in steed of the earle of Arundell, the Lord Graie Ruthin, or Ruffin, naperer, the Lord Audleie almoner, in steed of the erle of Cambridge. The earle of Worcester was that daie earle marshall, in the earle marshall's absence, who rode about the Hall upon a great courser, with a multitude of tipped staves about him, to make and keepe roome in the said Hall. Of the which Hall, the barons of the Cinque Ports began the table upon the right hand, towards St. Stephen's chappell, and beneath them, at the table, sat the vowchers of chancerie. Upon the left hand, next to the cupboord, sat the maior and his brethren, the aldermen of London. The bishops began the table, against the barons of the Cinque Ports; and the ladies against the maior. Of which two tables, for the bishops began the bishops of London and Durham, and for the ladies the countesse of Stafford and the countesse of North.

"The feast was all of fish, for the ordering of the service whereof were diverse lords appointed head officers, as steward, controller, surveior, and other honourable officers. For the which were appointed the earles of Northumberland and Westmoreland, the lord Fitzhugh, the lord Furnevall, the lord Graie of Wilton, the lord Ferres of Grobie, the lord Poinings, the lord Darcie, the lord Dacres, and the lord De la Warre. These, with others, ordered the service as followeth: and, for the first course, brawne in mustard, eeles in burneur, pike in herbage, fuiment with balien, lamprie powdered, trout, codling, plaice fried, martine fried, crabs, leech lumbard flourished tartes, and a devise called a pellican, sitting on hir nest with hir birds, and an image of St. Katharine (the patron saint of the queen) holding a booke, and disputing with doctors, holding this poesie in her right hand, writen in faire and legible letters, *Madame la Reine* (my lady the queen,) and the pelican answering,

C'est la signe et du roy,	'Tis the sign of the king,
Parer tenir joy,	That great joy he will bring,
Et a tout sa gent,	To all in his land,
Elle mette sa content.	By this fair lady's hand.

"The second course was, gellie coloured with columbine flowers, white potage or creame of almonds, breame of the sea, conger, cheuen, barbill and roch, fresh salmon, halibut, gurnard, rochet broiled, smelts fried, crevis or lobster, leech-damaske, with the king's poesie flourished thereon, *Une sans plus* (one without more), lamprie fresh baked, flampeine flourished with a scutchion roiall, and therein three crowns of gold, with flour de luces and floure of camomill wrought of confections, with a devise of a panther, and an image of St. Katherine, with a wheele in one hand, and a scrowl with a poesie in the other; to wit,

La royne ma fille,	This princess, my daughter,
In cesta ile,	In this isle girt with water,
Per bon resoun,	By her virtue will claim
Aves renoun.	Great honour and fame.

"The third course was, dates in compost, creame motle, carpe deore, turbut, tench, pearch with goion, fresh sturgion with welks, porperous rosted, crevesse de eau doure, pranis, eeles rosted with lamprie, a leech, called the white leech, flourished with hawthorn leaves and red hawes; a marchpane garnished with diverse figures of angels, among which was set an image of St. Barnabas, holding this poesie:

Il est ecrit,	It is Heaven's decree,
Pur voir et eit,	As all present may see,
Per mariage pure	That this marriage of peace
C'est guere ne dure.	Will make the wars cease.

"And, lastly, a devise of a tiger looking in a mirror, and a man sitting on horse-backe, holding in his arms a tiger's whelpe, with this poesie:

Per force, sans resoun, ie ay prise ceste best.
By force, without noise, I have taken this beast;

and with his own hand making a countenance of throwing of mirrors at the great tiger, with this poesie:

Gile che mirrour	The force of this mirror
Ma feste destour.	Subdues beasts of terror.

"Thus with all honour was finished the solemn coronation, after which the queene sojourned in the palace of Westminster till Palme Sundaie following; and on the morrow she tooke her journie towards Windsor, where the king and she held their Easter."

HENRY VI.

Henry VI. was crowned at Westminster, Nov. 6th, 1429, being then only in the ninth year of his age. The coronation feast was celebrated at Westminster with great splendour; but we shall only notice a few of the dishes and devices. In the first course, Fabian tells us there were, among other royal viands, "Bore hedes in castellys of gold and enarmed," "Custard royall, with a lyopard of golde syttyng therein, and holding a floure de lyce." The pageant for this course was, "A sotyltie of Seynt Edwarde and Seynt Lowys armed, and upon eyther his cote armoure, holdyng atwene them a figure lyke unto Kynge Henry, standynge also in his cote armoure, and a scripture passynge from them both, sayinge,—'Beholde II perfyght kynges under one cote armoure,' and under the fete of the said seyntes was wryten this balade:

Holy seyntes, Edward and Seynt Lowyce,
Concerve this braunche born of your precious bloode,
Lyne among Cristen, most soveraygne of price:
Inherytour of the flour de lyce so gode:
This sixt Henry to reygne and to be wyse,
God graunte he may, to be your mode,
And that he may resemble your knyghthode and vertue.
Praye ye hertely unto our Lord Jhesu."

The most remarkable dishes in the second course were, "Gely, party wryten and notyd with *Te Deum Laudamus*, a whyte leche plantyd with a rede antelop, a crowne about his necke with a chayne of golde." The device, or "sotyltie," was, "An emperoure and a kynge, arayed in mantellys of garters, which figured Sygysmounde the emperoure, and Henry V., and a fygure lyke unto Kynge Henry the VI. knelynge to fore theym, with this balade takkyd by hym:

Agayn, myscreauntes, the emperour Sygysmunde
Hath shewyd his myght, which is imperyall.
And Henry the V. a nobile knyghte was founde
For Cristes cause in actes marcyall,
Cheryshed the churche, to Lollers gave a fall,
Gyvynge example to kynges that succede,
And to theyr braunche here in especiall,
While he doth reygne to love good and drede."

In the third course we need only notice one dish, "A bake mete, lyke shylde, quarteryd red and whyte, sette with losynges gilt and floures of borage." This course also had a "sotyltie," *viz.*, "Our Ladye syttynge with her childe in her lappe, and she holdyng a crowne in her hande. Seynt George and Seynt Denys knelynge on eyther syde, presentyd to her Kyng Henryes fygure, berynge in hand this balade, as followeth:

O blessyd Lady, Cristes moder dere,
And thou, Seynt George, that called art her knyght,
Holy Seynt Denys, O master most entere,
The sixt Henry, here present in your sight,

Shedyth of your grace, on hym your heavenly lyght.
His tender youth with vertue doth anaunce,
Borne by descent, and by tytle of ryght,
Justly to reygne in England and in Fraunce.

"And thus," says Fabian, "this solempne coronacyon with all honoure and joy fynyshed."

On the 17th of December, 1431, Henry VI. was crowned at Paris, with the ceremonies usual at the coronation of French kings; he had the crown and sceptre of England borne before him, and wore those of France in the procession.

Margaret of Anjou, queen of Henry VI., was crowned on the 20th of May, 1445, at Westminster. She was received previously into London with great splendour. "The city," says Stowe, "was then beautified with pageants of divers histories, and other showes of welcome, marvellous, costly, and sumptuous."

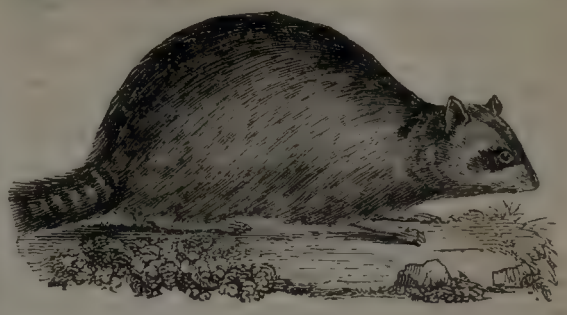
THE RACOON, (*Procyon lotor.*)

THE RACOON is a well-known animal in the United States of America, where it is hunted by the inhabitants chiefly for the sake of its skin, which passes as a kind of currency in Kentucky, and other western districts of the vast continent of North America, a *coon* skin being valued at a quarter of a dollar.

At first sight a Racoon might be mistaken for a fox, but its body is much shorter and thicker; and when carefully examined, it is seen that it belongs to quite another tribe of animals; Linnæus placed it among the bears, and called it (*Ursus lotor*). Although the Racoon is so well known in the United States, it is not confined to that country, but is found in great numbers in the larger West India islands. In Jamaica particularly, the Racoons come down from the woods in great troops during the night, and commit great havoc among the sugar-canes; they are also extremely fond of maize, birds-eggs, and even young birds; the land-crab, also, is frequently the food of this animal. The negroes consider the flesh of the Racoon an excellent meal, but it is not much relished by Europeans. The fur is very valuable, being considered next to that of the beaver in the manufacture of hats.

In Kentucky, the hunting of the *coon* forms one of the principal sports of the hardy inhabitants. Audubon, in his usual spirited manner, gives an entertaining account of his nights' adventures during a Racoon hunt. His host is about to start, and makes preparation for the hunt, this is during the night:—

Now mark him, the bold Kentuckian is on his feet, his sons and the stranger prepare to march. Horns and rifles are in requisition, the good man opens the wooden-hinged door, and sends forth a blast loud enough to scare a wolf. The Racoons scamper away from the corn-fields, break through the fences, and hie to the woods. The hunter has taken an axe from the wood pile, and returning, assures us that the night is clear, and that we shall have rare sport. He blows through his rifle to ascertain that it is clear, examines his flint, and thrusts a feather into the touch-hole. To a leathern bag, slung at his side, is attached a powder-horn; his sheathed knife is there also; below hangs a narrow slip of home-spun linen. He takes from his bag a bullet, pulls with his teeth the wooden stopper from his powder-horn, lays the ball on one hand, and with the other pours the powder upon it, until it is just overtopped. Raising the horn to his mouth he again closes it with the stopper, and restores it to its place. He introduces the powder into the tube, springs the box of his gun, greases the *patch* over with some melted tallow, or damps it, then places it on the honeycombed muzzle of his piece. The bullet is placed on the patch over the bore, and pressed with the handle of the knife which now trims the edges of the linen. The elastic hickory rod, held with both hands, smoothly pushes the ball to its bed; once, twice, thrice, it has rebounded. The rifle leaps, as it were, into the hunter's arms, the feather is drawn from the touch-hole, the powder fills the pan which is closed,—'Now, I am ready cries the huntsman.



THE RACOON.

The whole party now start for the woods, with dogs, and boys, and torches, after a few delays, from the difficulties of the road.

The boys had got up with the dogs, which were baying a Racoon in a small puddle, we soon join them with the light,—'Now, stranger, watch and see.' The Racoon was all but swimming, and yet had hold of the bottom of the pool with his feet. The glare of the lighted torch was doubtless distressing to him; his coat was ruffled, and his rounded tail seemed thrice its ordinary size, his eyes shone like emeralds; with foaming jaws he watched the dogs, ready to seize each by the snout as it came within reach. They kept him busy for several minutes; the water became thick with mud; his coat hung dripping, and his draggled tail lay floating on the surface. His guttural growlings, in place of intimidating his assailants, excited them the more; and they very unceremoniously closed upon him, curs as they were, and without the breeding of gentle dogs! One seized him by the rump, and tugged, but was soon forced to let go; another stuck to his side; but soon, the racoon, taking a better-directed bite of his muzzle than another dog had of his tail, coon made him yelp; and pitiful were the cries of luckless Tyke. The Racoon would not let go, but in the mean time, the other dogs seized him fast, and worried him to death, yet to the last he held by his antagonist's snout. Knocked on the head by an axe, he lay gasping his last breath; and the heaving of his chest was painful to see. The hunters stood gazing at him in the pool, while all around was rendered trebly dark and dismal by the flare of the torch. It was a good scene for a skilful painter.

The dogs soon discovered another Racoon, who had taken refuge in a tree, round which they had ranged themselves, seated on their haunches, looking upwards and barking. The hunters now employed their axes to cut down the tree, sending the chips about in all directions.

At length the tree began to crack, and slowly leaning to one side, the heavy mass swung rustling through the air, and fell to the earth with a crash. It was not one coon that was surprised here, but three—ay, three of them, one of which, more crafty than the rest, leaped fairly from the main top while the tree was staggering. The other two stuck to the hollow of a branch, from which they were soon driven by one of the dogs. Tyke and Lion having nosed the cunning old one, scampered after him, not mouthing like the well-trained hounds of our southern fox-hunters, but yelling like furies. The hunter's sons attacked those on the tree, while the woodsman and I, preceded by Toby, made after the other; and busy enough we all were, our animal was of extraordinary size, and after some parley a rifle-ball was sent through his brain. He reeled once only—next moment he lay dead. The rest were dispatched by the axe and the club, for a shot, in those days, was too valuable to be spent when it could be saved. It could procure a deer, and was therefore worth more than a coon's skin.

We have seen that the Racoon displays considerable courage and fierceness when acting on the defensive, but it is not naturally a savage animal; it is easily tamed, and will follow its master about, and from its activity and monkey-like tricks becomes an amusing pet.

FILTRATION OF THAMES WATER.

THE managers of the Chelsea works having determined to prosecute some plan for rendering the quality of the water supplied by them unobjectionable, in the spring of 1826, experiments were commenced and inquiries made upon the subject, so that when Dr. Roget, Mr. Brande, and Mr. Telford, (the Commissioners of Inquiry,) visited the works in the summer of 1828, they found the construction of filtering-works of some magnitude in an advanced state.

So little had been written on the subject of filtration of a practical nature, that the art of conducting the process upon a large scale was yet to be acquired, and improvements to be made upon the works at Glasgow, Manchester, and other places, where it appeared that instances of failure, as well as of success, had occurred. Preliminary experiments were indispensable to warrant expenditure of capital on such works, and several trials were accordingly made on superficies exceeding one thousand square feet, to ascertain the most approved principle, and the fitness of the various materials proposed to be employed. All the modifications of lateral and ascending filters proved disadvantageous; difficulties were encountered in preserving the various strata in their assigned position, according to the sizes of their component particles; and effectual cleansing could not be accomplished without the removal of the whole mass of the filtering medium. All devices by currents, reaction of water, and other means, also proved either inefficient, or inconvenient and expensive.

The mode of filtration adopted at the Chelsea works is by descent, and the medium consists of fine and coarse river-sand, comminuted shells, and pebbles, and of small and large gravel. These materials are laid in a reservoir, their surface being disposed in ridges, which presents to the spectator an undulated appearance. The first experiments by descent failed; sufficient care had not been taken in the selection and separation of the materials. Explosions of condensed air in the tunnels for collecting the filtered water deranged the strata occasionally, and were obviated by air-drains. The filtration was, in one instance, stopped by the addition of fresh sand, without having previously removed the old sand, which should be applied as the upper stratum; although, in this case, the surface had been thoroughly cleansed previously, a film or puddle was formed on the original sand, and was sufficiently supported by the particles of sand to sustain five feet head of water, at first acting to impede, and eventually to stop the filtration. The process was greatly improved by the introduction of the small shells, such as are usually found at Shellness, the flat surfaces of which overlap, and assist in the great desideratum of separating the sand from the gravel, and thus tending to preserve the free percolation in the lower strata, which is essential for ensuring filtration sufficiently rapid for waterwork purposes.

The strata on the site of the filtering-works, under the vegetable mould, consist of loam, sand, and gravel, overlying the London clay to the depth of thirty feet. The sand and gravel contain powerful land-springs, and the masses of ferruginous conglomerate they pass through are so great, that the water is of an objectionable quality; therefore, in constructing the basin to receive the filtering materials, it was necessary to exclude all the land-water by clay and cement walling.

An excavation into the sand and gravel, of sufficient depth to admit of the water from the river flowing on to the filtering bed, would have involved too great an outlay; and this circumstance led to the construction of the basin, at a level which rendered pumping the water from the river unavoidable; but the consequent subsidence of the water, and the command of a constant flow to the filtering-bed, are advantages which result from the expedient of pumping; and the interest of the money saved has more than compensated for the annual expense. The filtering-bed covers an area of one acre, and there is an elevated reservoir of nearly the same size. The lower stratum of gravel contains the tunnels for collecting the filtered water. They are built with cement-blocks, and partially open jointed, two spaces of an inch and a half on the bed, and the heading-joint of each brick being open. The fine gravel, pebbles and shells, and the coarse and fine sand, are laid upon the large gravel.

The water is let on to the filtering bed at nine places, and the ends of the pipes are fitted with curved boards to diffuse the currents of water, and prevent the surface of the sand from being disturbed. The interstices in the fine sand being more minute than the subjacent strata, it is found that the impurities are arrested near the surface, and it has not been necessary to remove more than one inch depth of the sand at any one time of cleansing. This work is effected by scraping the surface every fortnight, and upon a careful examination it has been discovered that the sediment penetrates to the depth of from six to nine inches, according to the state of the Thames water; the greatest penetration occurring during the prevalence of land floods in the river. Notwithstanding this, however, it is not necessary to remove more than the depth stated, which contains the grosser impurities, the remainder tending rather to improve filtration by rendering the interstices between the particles of sand still more minute. From these observations it must not be inferred that the process is merely a fine mode of straining, for something more is evidently effected; an appearance resembling fermentation being discernible when the water is in contact with the sand.

The quantity of water filtered is from three to four hundred thousand cubic feet daily, according to the demand. The undulated surface of the filtering-bed admits of parts of it being worked, and others drained; and it aids in cleansing, by admitting the grosser particles of the silt to slide down the ridges, and form a sediment easily manageable. The removal of the sand is effected by lifting portions of the fine sand in succession, and placing fresh sand of the same description underneath them.

There is every reason to anticipate the various works in course of execution by the London water companies will add greatly to the health, comfort, and convenience of the public, and as these works must of necessity be carried on by means of large capitals vested in fixed machinery, pipes, &c., for supplying an article consumable only on the spot, and as such machinery, pipes, &c., are of little or no value for any other purpose, they should not be interfered with upon slight grounds, or the representations of designing persons. It ought to be borne in mind that the deprivation of the accustomed supply of water in any particular district of the metropolis would be a calamity from which most serious injury to the public might ensue, more especially if it occurred in the summer, or during the prevalence of epidemic fever; and although the present supply of water in the metropolis is susceptible of improvement, it is superior to that enjoyed by any other city in Europe; and in any event, the preservation of that supply is a most important object.

[From a Paper by Mr. James Simpson, Resident Engineer at the Chelsea Water-works, in the *Life of Telford*.]

RECREATIONS IN NATURAL PHILOSOPHY.

No. III.

On Cohesion and Adhesion.

Why is it that two pieces of wood will not adhere or stick together, when we place their surfaces in contact; and that they will adhere when a surface or thin film of glue is between them? Why is it that two dry pieces of paper will not stick together unless paste or gum be interposed? The reader will reply, "because glue, paste, and gum, are *sticky* substances." But this term "sticky" gives us but little information concerning the cause and nature of the process; it will be worth while, therefore, to pay a little attention to this subject.

All bodies, whether solids, or liquids, or invisible gases, are formed of atoms, or very small particles, which are drawn or held together by a sort of attraction, the nature of which we are but little acquainted with. We know that the surfaces of our ponds become covered with ice in the Winter, and that the ice is formed from the water,—that it is, in fact, nothing more or less than solid water. Now, the whole reason why the water exhibits the solid form in one case, and not in the other, is, because the atoms of which it is composed are permitted to approach one another in such positions as to cohere or hold strongly together; and the reason why the particles or atoms are enabled thus to act upon each other, is, that a portion of heat which previously existed between the atoms has been removed by the cold weather. In the fluid state, heat acts as an obstacle, which prevents the atoms from acting on one another with that energy which they would do if the heat were not present.

In the condition of a liquid, the particles of a body have almost lost all their attraction for each other, for we may divide a tea-cup full of water into a thousand separate parts, with ease; but to divide the same bulk of ice into a thousand pieces, we must use mechanical force; the particles of which it consists, cohere or stick together so strongly, that some force is necessary to part them.

If we hold a piece of iron wire between the two hands, and try to pull it asunder, we fail in so doing: why is this? there is no glue, or cement, or paste, between the particles of iron? It is true that there is not one of these; but there is that which is more powerful, namely, a strong coherent attraction between particle and particle, by virtue of which each one refuses to part from those by which it is surrounded, unless a force is employed superior to that which binds the particles together.

It may be asked,—If this is the case, why do not two pieces of wood stick together, when we place their smooth surfaces in contact? The answer is, that the coherent attraction is exerted only at very small distances, and that as soon as those distances are exceeded, the particles are deprived of the power of acting upon one another. What the size of the particles is, or what are the distances between them, are questions totally out of our power to answer. Science has done much in measuring the minute and the great in nature, but it has failed in measuring the size of the atoms of matter. It is very certain that when we place two smooth surfaces of wood together, so as to make them appear in actual contact, the distance between them is far greater than that between the particles which compose the wood; that such is the case may be partially proved in the following manner. If we take two pieces of lead, cut from the same piece, so as to have two clean, freshly-cut surfaces, and if we apply those two surfaces together, they will not adhere; but if we rub them against each other for a short time, they will adhere together, and will require much force to separate them. The reason of this is, that in the first instance, the two surfaces, although apparently in contact, were too far asunder to permit the particles of the one to act upon those of the other; but, by rubbing them together, the surfaces become smoother, so as to allow them to approach closer together.

We must now make a difference between cohesion and adhesion. We shall apply the term cohesion to the attraction between the particles of the same body; and adhesion, to that manifested between different bodies.

We said, that in water, the power by which the particles cling together is exceedingly small; but there are many instances which show that it is not entirely absent. All schoolboys are acquainted with the game of "duck and drake:" a piece of slate, or a flat oyster-shell, is hurled obliquely on the surface of a pond, where, instead of sinking in the water, it rebounds and proceeds forward, then rebounds again, and so on, taking, perhaps, seven or eight long leaps over the surface of the pond before it finally sinks beneath the surface; the greater the number of leaps, the greater is the skill of the performer considered to be. This it would not do, if there were not some cohesive force between the particles of water which enable them to resist the entrance of the object between them, until its velocity is almost spent. The experiment proves two things, namely, that water has a slight cohesion and a slight elasticity: if it had not the latter, the slate or shell would not rebound from its surface.

We all know that we cannot heap water up in a measure, as we can coals or corn, because it flows over when we have filled it up to the brim. But if we notice when the water in a cup reaches the edge, we shall find that we can still pour a little more into it, provided we do it with care, and not wet the edge of the cup. Suppose that the adjoining figure, fig. 1, represents the cup in two different stages of its fulness. In the one case, where the cup is only partially filled, the surface of the water is nearly flat; it is, however, a little raised at the edges on account of a slight attraction between the cup and the water. But in the other instance, we see that the water is considerably above the dotted line, which represents the level of the edges of the cup: the surface of the water is convex.

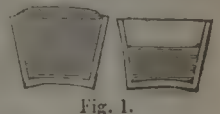


Fig. 1.

Now this arises from a slight cohesive attraction between the particles of water. It is so slight that the water soon begins to flow over when the level of the edge has been attained and exceeded, but still the cohering or sticking together of the particles is sufficient to enable a small mound of water to remain above the level of the vessel so long as the edge remains dry.

Daily experience tells us that iron and steel are heavier than water: if we place an iron nail or a steel ring or key on the surface of water, they will not remain there, but will sink. The reason is, that they are, bulk for bulk, heavier than water, and therefore obey the general law of the heaviest going to the bottom. But there is a mode in which this law may be prevented from acting, by bringing the cohesion of water into play. It is the following.

If we take one or two slender-sewing needles, and place them very gently on the surface of water, as in the following figure, (fig. 2,) they will swim or float on the surface, although they are made of steel of as

heavy a quality as keys, or rings, or any other articles. The reason is that the cohesion of the particles of the upper layer of water, is sufficient to resist the entrance of the needle between them, as the needle is very small and light. The needle must not be wetted, or it will sink: when the experiment succeeds the needle lies in a little trough which it hollows for itself in a watery couch.

Fig. 2.

Fig. 3.

Many insects can perform a feat which no other animal, man not excepted, could accomplish without the aid of water-shoes, and much instruction, that is, they can walk on the surface of water. It is a pleasant sight to witness the sportive movements of a species of aquatic water-bug, and many other insects, whose slender feet move with agility on the surface of the water without sinking, simply because they have not the force to overcome the cohesive attraction of the watery particles. Fig. 3 represents an insect on the surface of the water. Some insects have their feet fringed, and the lower part of their bodies covered, with exceedingly fine hairs which buoy them up, and sometimes collect a globule of air under them which makes them still more buoyant, others use their wings by way of sails. Some of these aquatic insects have their bodies so highly polished that the water will not adhere to them.

These are examples of cohesion in a fluid. We shall have some proof of a similar power in solids, by taking two pieces of plate-glass and laying one on the other: they will cohere so strongly that it will require much more than the weight of the upper plate to lift it from the lower. This is because plate-glass is so very flat and smooth, that the particles of one surface are enabled to act upon those of the other. Very few manufactured articles are so flat and so smooth as plate-glass.

Particles of glue have the property, when softened or liquified, of adhering strongly to wood; and those of paste of adhering strongly to paper. When, therefore, we rub a thin coating of glue on a surface of wood, and upon that place another surface of wood, we have two examples of adhesion and one of cohesion: the lower surface adheres to the glue,—the upper surface does so likewise,—and the different particles of glue cohere or cling together,—so that all three form one body. It is, therefore, not strictly true to say that we make two pieces of wood stick together; we make the glue stick to the lower piece, and the upper piece sticks to the glue; but the two pieces of wood do not touch each other. The same observations which we have here employed with respect to two pieces of wood with glue between them, also apply to two pieces of paper with paste between them.

If we put a penny piece on a wet table, we cannot take it up again so easily as if the table were dry. The thin film of water adheres slightly to the table, the piece of copper adheres slightly to the water, and the particles of water slightly cohere among themselves; all these tend to make the penny piece rather more difficult to lift from the table; but as they are all small in amount, the difficulty is soon overcome.

If we wet the two plates of glass, of which we lately spoke, before we lay one on the other, we shall find that they cling together with much more force than before: the water acting as a species of glue.

The formation of a globular drop of water is an instance of cohesion. Water never falls to the earth particle by particle; but the particles cling together until their collective mass is too heavy to remain longer suspended, upon which they fall in the form of drops.

The production of friction, which is so often an obstacle, and so often an advantage, in our machines, is greatly dependant on the adhesion of the surfaces of the rubbing bodies. The smoother the surfaces are, the easier do the bodies move on each other; but no degree of smoothness will do away with friction altogether; some will always be due to the adhering attractions of the two surfaces.

When we break a tea-cup, or a glass goblet, we may put the pieces together again, and they may fit so well that we can scarcely see the joint; but they will not hold: the attraction of cohesion has been broken, and we cannot put the edges so close together as they were before: a film of air will remain between them, and will prevent the cohesive force from acting.

The adhesion of solids to liquids is very great, and its amount may be ascertained by a contrivance represented in fig. 4. To the arm of a balance c, suspend a scale-pan at one end and a vessel of water

Fig. 4.

from the other end; place weights in the scale-pan until equilibrium is established. Let us now suspend a disk of copper, wood, or marble, or any solid substance from its centre, and firmly attached to a wooden upright, which is also fixed. The disk should be of the same height as the level of the water, which must be brought under the disk, as represented in the figure. The surface of water will adhere to the under surface of the disk with considerable force, so much so, that we may greatly diminish the weights in the scale-pan, and the cylinder of water will not fall down. A number of metal disks of the same size and thickness were thus applied to the surface of mercury, and it was found that weights could be taken out of the scale-pan as follows:—

Disk of Gold	446	grains
—— Silver	429	,,
—— Tin	418	,,
—— Lead	397	,,
—— Bismuth	372	,,
—— Platinum	282	,,
—— Zinc	204	,,
—— Copper	142	,,
—— Antimony	126	,,
—— Iron	115	,,
—— Cobalt	8	,,

It thus appears that among the metals the attraction of adhesion is greatest between gold and mercury, and least between cobalt and mercury.

WHEN a man chooses the rewards of virtue, he should remember, that to resign the pleasures of vice is part of his bargain.——WILBERFORCE.

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CULTIVATION OF THE MANIOC PLANT.

THE PREPARATION OF MANIOC FLOUR.

THE MANIOC, (*Janipha manihot.*)

THIS plant, which is cultivated in most of the hot climates of the earth, in Asia, Africa, and America, produces the substances called Cassava, Manioc flour, and Tapioca. There are many species of the genus Janipha and Tapioca, in most of which the juices and seeds are considered poisonous, on account of their violent purgative qualities; among these is the plant in question. The Janipha Manihot is a shrub, whose native place seems to be the warmer parts of South America; it rises to the height of six or seven feet; its stem is twisted in its growth, and covered with knots or bumps; it is full of pith, and is covered with a thin reddish-coloured bark.

It is particularly cultivated in America, and the West Indian islands near the Spanish Main, where, when made into *Cassava-bread*, it forms a very important article of nourishment for the Negro population. During its growth the colour of its stems, flowers, and roots, vary considerably, according to the age and healthy state of the plant.

The means employed to separate the deleterious matter from the nourishing portion of the Manioc, are extremely simple, and, at the same time, so certain in their effects, that the Cassava-bread has never been known to produce ill effects. The Manioc, as an article of nourishment, is as useful to the Americans as corn and rice are to the natives of Europe and the Asiatics, and it has this advantage, that its cultivation is attended with less risk of a failure of the crop. The quantity of food procured from a piece of ground of the same extent, is also much greater; and during nearly the whole time of its growth, it may be gathered and prepared for food. Where it is cultivated merely for the consumption of the grower, a quantity sufficient for a week or a month is usually gathered, and the remainder may be left in the ground with safety for a considerable time: if, however, it remain too long in the earth, it is apt to rot, or become too hard for use.

When the time for gathering the crop has arrived, the stems are stripped of their leaves, and the roots are drawn out of the earth without much difficulty; the roots are separated from the stem and carried to a shed, where the rind, or bark, is scraped off with a knife: they are then washed in water and afterwards reduced to a pulpy substance by means of a rasp. When in this state, the Manioc is placed either in mats or linen bags, and submitted for a considerable time to the action of a powerful press; when the moisture has been sufficiently extracted from the mass, it is rubbed through a kind of sieve with wide

meshes, and is then carried to the stove to be prepared as Cassava-bread, or Manioc flour.

To make the Cassava, a round, flat, iron plate, about two feet in diameter and half an inch in thickness, is employed; this plate is mounted on four legs, and a fire is kindled beneath it. As soon as the plate becomes hot, the surface is covered with the rasped root to the depth of about an inch and a half; care is taken to spread it of an equal thickness in all parts, and, as it becomes warm, to press it down with the blade of a large knife, or spatula, made of wood. The cooking is allowed to proceed without disturbing the pulp, the grains of which, being still damp, adhere to each other and become a solid mass, which contracts in thickness considerably by the effect of the heat; the cake is next turned on the plate, that each side may be done alike. When the cooking is finished, the Cassava is in the form of a thin biscuit, of the size of the iron plate. It is placed in the air to cool, where it becomes hard and firm, and can be easily broken in pieces.

The preparation of Manioc flour only differs from that of Cassava in preventing the grains of the pulp from uniting with each other into a solid mass. To prepare the flour in great quantities, a flat-bottomed, copper pan is employed, about four feet across and seven or eight inches deep. This pan is heated, and as the rasped root is thrown in, it is briskly stirred and bruised with a kind of mallet of wood. The constant stirring prevents the grains from uniting with each other while they are losing their moisture, and it also causes them to be equally cooked.

When sufficiently done (which is known by its assuming a reddish colour, and by its savoury smell), it is taken out of the pan with a wooden shovel, spread on coarse cloths to cool, and packed in barrels, in which it can be preserved for a great length of time.

The smaller the grains of the Manioc are, the more delicate it is considered. The Cassava-bread and the flour are rarely eaten without some further preparation. Before being served they are soaked in water, or soup; in these liquids they swell considerably, and form a solid and wholesome nourishment which the Negroes prefer to bread.

The sap which is pressed out of the root of the Manioc, contains an extremely fine and white *fecula*, or starch, which settles at the bottom of the liquid. To obtain this substance, the liquid is allowed to remain for several hours, in the pan in which it has been received; the sap is then poured off, the starch washed in several waters, and dried. This dry starch is sprinkled with a little water, and placed over the fire and steamed, until it assumes the form of an irregular, viscid mass, and then dried in the sun until quite hard; when broken into small grains it is known in Europe under the name of Tapioca, a substance which is used by the French in the composition of various kinds of cakes and pastry. It is sometimes made into hair powder; being dried, bruised in a mortar, and sifted through a very fine sieve. In this state it is used in frying fish, and for other purposes where wheaten flour is employed. The sap yields an intoxicating liquor.

A substance resembling Tapioca can be prepared from potato-starch, by boiling it before it is dried, and stirring it so as to break it into lumps.

The substances we have been describing can be kept good for fifteen years or more. Aublet, the French botanist, declares that he preserved some Tapioca in a box for this length of time, and that it was as wholesome, and formed as good food, as on the day when it was first placed there. Ten pounds of this substance, he says, are sufficient food for a traveller for fifteen days; those who embark on the river Amazon carry no other provisions; a little water or broth, either hot or cold, poured over two ounces of tapioca, will form a very good meal. Horses also can be fed on it.

The expressed juice of this plant, as we have already noticed, is a violent poison: a few minutes sufficing to produce death. M. Fermin, a French physician, administered this poison, in a moderate dose, to dogs and cats. The quantity did not exceed an ounce and a half, and death generally took place in about twenty-four minutes. This poison is supposed to produce death by its action on the nerves, for on dissection no inflammation or corrosion had taken place. From this it is conjectured that the poisonous portion of the sap is of a very volatile nature, and easily got rid of by the action of heat. It is said to lose its poisonous properties by being merely exposed to the action of the air for twenty-four hours. Thirty-five drops of this juice were administered to a negro, convicted of murder by poisoning, and in the course of six minutes he was a corpse, thus showing that the poison acts with greater violence on the human frame.

Rochefort, after describing the violence of this poison, says, that the poor Indians of the larger islands of the West Indies, being persecuted with fire and sword by the Spaniards, took away their own lives by partaking of the juice of the Manioc. He also states that in his time there was a place in St. Domingo, which went by the name of the Cavern of the Indians; it was filled with the bones of more than four hundred human beings, who had destroyed themselves to avoid falling into the hands of the Spaniards.

The engraving at the head of this paper represents the preparation of the Manioc flour, by the negroes, in Brazil. It will be seen that females are employed in this laborious work, under the superintendence of a task-master. The Manioc is said by those who have been in that country to exhaust the soil exceedingly, and they attribute to this cause the unproductiveness of many tracts of land. They reckon in Brazil as many as thirty species of Manioc.

The late Baron Rothschild was the son of a Jew at Francfort, of the name of Joseph; he was in humble circumstances, but very highly thought of for honesty and integrity. At the time the French crossed the Rhine and entered Germany, the Prince of Hesse Cassel came to Francfort, and asked Joseph to take charge of his money. Joseph did not much like the undertaking, but the prince pressed it so much that at last he consented, and the treasures were given him. When the French entered Francfort, Joseph buried the prince's money and jewels in a chest, but he did not hide his own, thinking if they found no money they would be suspicious and search more earnestly; the consequence was he lost all his own money. When affairs became more tranquil, and he could again enter into business, he took some of the prince's money and transacted business with it, as he formerly used to do with his own, thinking it a pity it should lie quite useless. The Prince of Cassel had heard of the French cruelty in plundering poor Joseph Rothschild, and concluded all *his* money and jewels were gone. When he went to Francfort he called on him, and said, "Well, Joseph, all my money has been taken by the French."—"Not a farthing," said the honest man, "I have it all; I have used a little in my business; I will return it all to you, with interest on what I have used." No," said the prince, "keep it; I will not take the interest, and I will not take my money from you for twenty years; make use of it for that time, and I will only take 2 per cent. interest for it." The prince told the story to all his friends; Joseph was in consequence employed by most of the German princes, he made an immense fortune, his sons became barons of the German empire; and one of them settled in England.

CHAPTERS ON CORONATIONS. No. VI.

SERVICES PERFORMED AT THE CORONATION BY TENURE OF GRAND SERGEANTRY. THE COURT OF CLAIMS.

"TENURE by grand serjeantry," says Littleton, "is where a man holds his lands or tenements of the sovereign by such services as he ought to do in his own person, as to carry the banner of the king, or his lance; or to lead his army, or to be his marshal, or to carry his sword before him at the coronation, or to be his sewer at his coronation, or his carver, or his butler, &c." In some curious instances we find that the duties of this tenure were allowed to be performed by deputy. Lord Coke informs us that at the coronation of King Richard II., a citizen of London who held by grand sergeantry, had a deputy appointed for him, because he was not of sufficient quality. A knight, it appears, was the lowest in rank who could do any personal service to the sovereign on such occasions. A female may appoint a deputy, but the sovereign claims the privilege of nominating the substitute for a person of tender years.

The petitions, or claims, generally assert a right of performing certain services, apparently menial, as the condition by which manors and estates are held. Such tenures are very common in feudal history, but they appear to have been derived from the Byzantine empire, where the officers of the palace usurped the chief authority of the state. In England, all lands are supposed to be held either mediately or immediately from the king; and some of the conditions on which manors were granted, will show that the tenures of grand sergeantry to which our attention must be more particularly directed, are far from being without a parallel. We shall select a few of the most singular from Blount's *Fragmenta Antiquitatis*.

In the 19th of Henry III. Walter Gately held the manor of Westcourt in Bedington, Surrey, on the condition of yielding yearly to the king one cross-bow, value twelve pence. In the 14th of Edward III. three persons held thirty acres of land at Carleton in Norfolk, by the service of bringing the king, should he be in England, twenty-four pastres of herrings on the first coming-in of the fish. In the 34th of the same king, a man held a manor in Kent, for providing a man to lead three greyhounds whenever the king should go into Gascony, so long as a pair of shoes, valued at four pence, should last. In the 1st of Edward II., Peter Spileman held a manor on condition of finding straw for the king's bed, and hay for his horse.

We find in the age of the Plantagenets many examples of such tenures. One held a manor by paying two white capons annually; another by carrying the king's standard whenever he happens to be in the county of Sussex; another by being marshal or director of the laundresses, female suttlers, and other women who may accompany the king's army: the lord of the manor of Elston, in Nottinghamshire, pays yearly a rent of one pound of cummin-seed, two pairs of gloves, and a good steel needle; another manor is held on condition of repairing the iron of the royal ploughs and harrows; and in the 13th year of Edward I. we find the manor of Hohenorton in Warwickshire granted to Ela, countess of Warwick, on condition of her carving for the king at his birth-day feast, and taking as her fee the knife which he uses at table.

We come now to the services specially rendered on the coronation; and of these the first is that of the hereditary GRAND ALMONER of England. An almoner, as his name denotes, is an officer appointed to distribute alms to the poor, and such a one was anciently attached to all monasteries; for by the ancient canons all monasteries were obliged to spend one-tenth of their income in charity. By another ancient canon every bishop was obliged to keep an almoner, and such an officer was attached to most European courts. Before the Revolution, the grand almoner of France was the highest ecclesiastical dignitary in the kingdom. To him belonged the superintendency of all hospitals and houses of lepers. The king received the sacrament from his hand, and he said mass before him in all grand ceremonies.

The duty of the English grand almoner is to distribute the alms collected in a silver dish on the day of coronation, and also to divide among certain poor persons the blue cloth on which the sovereign walks from the throne in Westminster Hall to the door of the Abbey. He receives as his fee the silver dish in which the alms are collected, and also the napkin by which it is covered. John, earl of Exeter, who held the manor of Bedford at the coronation of Charles II., claimed in addition a tun of good wine, for his own proper use, which was disallowed.

From the earliest ages of England, the CHIEF BUTLER has been considered one of the principal officers in attendance at the coronation feast. We learn from the Holy Scriptures that the office of chief butler was one of great importance and dignity at the court of the Pharaohs; for Joseph requested the chief butler, who was his companion in the prison, to procure his liberation, when the butler should be restored to his former place; and it was actually by his interference that Joseph was introduced to the court, and engaged to interpret the dreams of Pharaoh. The dread which the Persian kings entertained, and not without cause, of being poisoned by some of their family or servants, induced them to grant the highest honours to their chief butlers, or, as they were more generally termed, cup-bearers. It was the duty of such an officer to serve the king with wine, but he previously poured some of the liquor into the hollow of his hand, and drank it in the king's presence, as a proof that nothing pernicious had been mingled with the wine. This institution was adopted in the Byzantine empire, where the customs of oriental monarchies were strangely blended with those of imperial Rome, and from thence it passed into the different kingdoms of western Europe, but rather as a matter of state and ceremony than of any real or supposed utility.

The office of arch-butler in the German empire was held by the king of Bohemia; he was bound to present the first cup of wine to the emperor, not only at the coronation-feast, but at all imperial entertainments. It was only, however, at the time of a coronation that he was compelled to wear his crown while officiating. Several prerogatives were attached to his office: he took precedence of all temporal electors; he walked in procession immediately after the emperor, the empress and the electors of Mentz and Cologne following, and he had the third voice in the electoral college.

The chief butler of France *(Buticularius Franciæ)* was one of the four great officers of the household of the ancient kings of that country, who signed all the royal patents, or at least was present at the despatch of them. His seat was among the princes of the blood, and he even disputed presidency with the constable of France. He had a right of presiding at the chamber of accounts; and in the registers of that office of the year 1397, mention is made that John de Bourbon, grand butler of France, was admitted there as first president. In later times, the title was abolished, and a new office of *grandechanson*, or cup-bearer, a merely nominal dignity, was instituted in its stead.

The office of butler of England was granted by William the Conqueror to one of his companions in arms, William de Albini, and united by tenure of grand sergeantry with the castle and manor of Buchenham, and certain other manors in the county of Norfolk. It seems probable that this office was not one of mere state, but was connected with the collection of a duty levied by virtue of the royal prerogative on all wines imported into the country. This duty was usually called the prisage of wines, and was originally the best cask of wine before the mast, and the best cask of wine behind the mast. As, however, it soon became usual to pay a pecuniary composition instead of the wines, the levying of prisage in England was transferred to the ordinary officers of the revenue. The prisage of wines in Ireland was granted to the Fitzwalters, who thence took the name of Butler, and it was long a hereditary privilege of the earls of Ormond.

The office of chief butler was transmitted to William, the second of the Albini family, a very remarkable person in his age; and as his romantic history is connected with the butlery, we shall extract it from Dugdale.

It happened that the queen of France, being then a widow and a very beautiful woman, became much in love with a knight of that country, who was a comely person, and in the flower of his youth; and because that she thought that no man excelled him in valour, she caused a tournament to be proclaimed throughout her dominions, promising to reward those who should exercise themselves therein according to their respective merits, and concluding that if the person whom she so well affected, should act his part better than others in those military exercises, she might marry him, without any dishonour to herself.

Hereupon divers gallant men hasting to Paris, among others came over this our William de Albini, bravely accoutred, and in the tournament excelled all others, overthrowing many, and wounding one mortally with his lance; which being observed by the queen, she became exceedingly enamoured of him, and forthwith invited him to a costly banquet; and afterwards bestowing certain jewels upon him, offered him marriage. But he, having plighted his troth to the queen of England, then a widow, refused her; whereat she grew so discontented, that she consulted with her maids how she might take away his life; and in pursuance of that design enticed him into a garden where there was a secret cave, and in it a fierce lyon, into which she descended by various steps, under colour of showing him the beast. And when she told him of his fierceness, he answered that it was a womanish and not manly quality to be afraid thereof; but having him there, by the advantage of a folding-door, thrust him in to the lyon. Being therefore in this danger, he rolled his mantle about his arm, and putting his hand into the mouth of the beast, plucked his tongue out by the root, which done, he followed the queen to her palace, and gave the tongue to one of her maids to present to her.

Returning therefore into England, with the fame of this glorious exploit, he was forthwith advanced to the earldom of Arundell, and had for his arms the lyon given him; nor was it long after that the queen of England accepted him for her husband, whose name was Adeliza, widow to King Henry I., and daughter to Godfrey, duke of Lorraine, which Adeliza had the castle of Arundell and the county in dowry from that king.

Absurd as this legend seems, we find it gravely repeated by several ancient historians; and the lion without a tongue appears among the armorial bearings of the Arundel family. It is of more importance to observe, that from this time the right to the chief butlery began to be connected with the earldom of Arundel, and to be gradually dissevered from the manors in Norfolk.

Hugh, the last of the Albini family, at the coronation of Eleanor, queen of Henry III., exercised the right of performing the office of butler by deputy. He was himself incapacitated, for he lay under sentence of excommunication, pronounced upon him by the archbishop of Canterbury. The cause of this excommunication is singularly characteristic of the age. The archbishop of Canterbury claimed the right of hunting in any forest of England at his pleasure, and went to enjoy the sports of the chase in one of Hugh's forests in the county of Sussex. De Albini turned the archbishop back with contumely, and seized his dogs for the trespass, upon which the prelate pronounced sentence of excommunication.

On the death of Hugh de Albini, his inheritance was divided between his sisters, and from the second of these the earls of Arundel are descended; they have claimed and enjoyed the office of chief butler since the reign of Edward II., but not without many ineffectual struggles on the part of the lords of the manors, with the tenure of which the office was originally connected.

GRAND BUTLER AND CARVER AT A ROYAL FEAST.

The fees claimed by the chief butler are the best gold cup and cover, with all the vessels and wine remaining below the bar on the day of coronation. The entire claim was disallowed at the coronation of Henry IV., but since that time the gold cup and cover have been received by the dukes of Norfolk, who hold the earldom of Arundel. In the engraving we have given a copy of an ancient painting, representing a king, attended by the chief butler and chief carver.

The lord-mayor of London, as assistant to the chief butler, serves the sovereign with wine in a gold cup, during the coronation feast, receiving the cup with its cover as his fee. The mayor and burgesses of Oxford also assist in the butlery, receiving three maple cups as their fee. The mayor of Oxford receives in addition a gilt cup, and so does the lord of the manor of Great Wimondley in Hertfordshire, who takes the title of Chief Cup-bearer.

The claims to the office of Sewer, who arranges the order of the dishes, and also the claims to the office of Carver, are now extinct. In the reign of Richard the Second the office of carver was claimed by John of Gaunt, king of Castille and Leon, duke of Lancaster, in right of his earldom of Lincoln, and the duties were performed by his deputy, the

earl of Stafford. But, at the coronation of William and Mary, the claims of John, earl of Lincoln, to this office were disallowed.

The office of GRAND PANNETER, whose duty it is to preside over the pantry, and to bring from thence the salt-cellars, spoons, and knives, used by the sovereign at the coronation feast, receiving the same afterwards as his fee, was anciently held by the Beauchamps, earls of Warwick, as the tenure of the manor of Kibworth Beauchamp, in the county of Leicester. On the extinction of that family, it was granted by Elizabeth to her favourite Robert Dudley, earl of Leicester, but on his dying without issue, it reverted to the crown. At the coronation of William and Mary the office was claimed by William Beveridge, count of the German Empire, as lord of the manor of Kibworth Beauchamp, but the claim was disallowed. Sir William Halford, Bart., renewed the claim on the same ground at the coronation of George the Second, but was equally unsuccessful.

The office of CHIEF LARDINER, whose duty it is to attend to the provisions in the royal larder on the coronation day, receiving all that remains unconsumed as his fee, is attached to the manor of Scoulton, in the county of Norfolk. At the coronation of Richard the Second the office was performed by John Fitz John, who had married the heiress of the manor. It has since been exercised by the Lords Abergavenny, though it has been sometimes counterclaimed by the Maynard family.

The manor of Ashill, or Ashley, in the county of Norfolk, was held by the tenure of performing the office of NAPIER, that is, guardian of the napery or table-cloths used at the royal table. Blomefield informs us, "William de Hastyngs was steward to King Henry the First, by virtue of the serjeantry of the manor of Ashley, the service being to take charge of the nappery, namely, the table-cloths and linen, at the king's coronation."

The manor subsequently passed into the Grey family; and at the coronation of Henry the Fourth, A.D. 1399, the office was executed by Lord Grey de Ruthyn, who received his fees. In 1512, Ashley, with all its manorial privileges, was sold to the Wyatt family. It was forfeited by the subsequent rebellion of Sir Thomas Wyatt, and thus the privileges annexed to it were lost. Sir Henry Bedingfield claimed the office of Napier, as lord of the manor of Ashley, at the coronation of James the Second, as did Francis Loggin and Richard Whitborne at the coronation of George the Second; but, on inquisition, it was found that Queen Mary had granted the manor to the Bedingfields by tenure of knight's service, not grand sergeantry, and the claim was disallowed.

The manor of Liston, in the county of Essex, is held by grand sergeantry, on the condition of placing five wafers, that is, thin cakes of flour, before the king, as he sits at dinner, on the coronation day. In the reign of Richard the Second this service was personally performed by Richard Lyons, a celebrated lapidary and wine merchant. This Richard Lyons was the master of the notorious Wat Tyler, and was one of the first persons beheaded by his order.

The manor of Heydon, in Essex, is held by tenure of grand sergeantry, on condition of its lord holding the basin, ewer, and towel wherewith the king washes his hands before dinner on the coronation day, receiving the towel as his fee. Anciently the manor was divided into two moieties, and the lord of one held the basin, while the lord of the other presented the towel.

The manor of Addington, in the county of Surrey, is held by the tenure of serving up, on the day of coronation, "one mess in an earthen pot" prepared in the royal kitchen. "Diligrout, girout or gyroun, and if seym (swine's lard) be put therein, it is called *malpigemoun*, or *maupygemun*." The origin of this tenure was, that Bartholomew de Cheney, to whom it was originally granted, appears to have been the cook in Henry the First's palace. The claim was raised so early as the reign of Henry the Second, and has been allowed at every successive coronation. Manning, in his *History of Surrey*, gives the following account of this ancient dish: "It was called a pottage, and consisted of almond milk, brawn of capons, sugar and spices, and chickens parboiled and chopped," thus, according to the old nursery rhyme, which probably originated in this very tenure, forming "a dainty dish to set before the king."

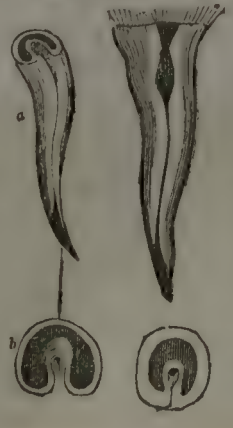
The manor of Belsington, in Kent, is held by the service of presenting the king with three maple cups on the day of his coronation.

POISON-FANGS IN SERPENTS.

THE commonly-received opinion, in regard to the structure of the poison-fangs of venomous serpents is, that the tooth is perforated by a small hole, which communicates with the bag at its root, in which the poison is placed; but this is an error. The canal by which the poison is conducted to the extremity of the tooth is a deep groove, or slit, formed by a kind of folding or rolling up of the tooth: this groove is not covered with enamel like the other parts. The appearance it assumes in different species of snakes is not the same; in the Cobra de Capello the edges of the groove are rounded, while in the rattle-snake they are angular, and so closely adapted to each other as not to be easily noticed. The poison-fangs of serpents are placed on each side of the upper and lower jaws, and near their extremity; they are two in number, one on each side, and it is believed that when one is destroyed another supplies its place, but this is a fact not very clearly established. The poison itself has the appearance of oil, but in its general properties it resembles gum; its noxious qualities continue even after it is dried.

From the structure of the fangs the poison is instilled into the bottom of the wound, and if in any quantity, and it enters any of the larger vessels, death speedily follows; in other cases, the wounded limb alone is affected, and the effects are gradually dissipated. But the virulence of the poison depends on several circumstances, particularly the species of the serpent, its condition at the time, and the habit of body of the animal bitten. In spite of all that has been written on the subject, there appears to be no certain cure for the bite of a venomous serpent.

Fig. 1. Fig. 2.



The tongue of a serpent is forked at its extremity, and is believed by some to be poisonous; after what we have stated, it is needless to say the idea is erroneous.

Fig. 1, *a*, is a magnified view of the poison fang of the Cobra de Capello, or Hooded Snake of the East Indies; *b* is a section of the same tooth. Fig. 2 represents a magnified view of the poison-fang of the rattle-snake.

COMPARATIVE TABLES OF THE WEIGHTS, MEASURES, AND MONIES OF EUROPE,

WITH OBSERVATIONS ON ELEMENTARY MEASURES, AND ON MONIES OF ACCOMPT.

COMPARISON OF WEIGHTS.		English Grains.	No. equal to 100 lbs. Avoirdupois.
England	Pound Avoirdupois	7,000	100·000
Amsterdam	Pound	7,625	91·803
France	Livre Usuelle	7,717	90·708
	Kilogramme	15,434	45·354
Munich	Pound	8,656	80·868
Prussia	Pound (2 Cologne marks)	7,218	96·979
Rome (Modern)	Libbra	5,234	133·741
Rome (Ancient)	Pondo or Libra	5,174	135·291
Russia	Pound	6,318·5	110·785
Spain	Libra	7,101	98·577
Sweden	Pound (32 Lods)	6,563	106·658
Vienna	Pound	8,645	80·972

ELEMENTARY MEASURES OF LENGTH.		English Inches.	No. equal to 100 English Feet.
England	Foot	12·00	100·000
Amsterdam	Foot	11·41	105·171
Rhineland	Foot	12·35	97·166
France	Pied de Roi	12·78	93·896
	Metre	39·37	30·480
Munich	Foot	11·37	105·540
Prussia	Rhineland Foot	12·35	97·166
Rome (Modern)	Foot	11·72	102·389
Rome (Ancient)	Pes	11·60	103·448
Russia	Foot	13·75	87·272
Spain	Foot	11·12	107·913
Sweden	Foot	11·68	102·739
Vienna	Foot	12·45	96·385

In the above table of elementary measures of length, the agreement of all Europe in referring to the human foot as a basis of measurement, is very remarkable; and not less useful than remarkable, as furnishing an approach to universal language; so that when we read of any length expressed in feet, we know it cannot err in excess beyond a seventh part, nor in defect above one-nineteenth part of English measure, proportions which approximate sufficiently to satisfy the mind for general purposes, and to produce the great advantage of not interrupting any train of thought by the necessity of extraneous reference, unless in cases which demand regular investigation and precision.

As the shortest of the enumerated European measures of length estimate the human foot as exceeding eleven inches English, we may conclude that all have had their origin in the ancient Roman foot, which was to our own as eleven inches six-tenths (11·6); exceeding the usual length of a human foot considerably, and perhaps taken from the *Footstep mark* of a sandal or clumsy shoe. Five of these feet made the Roman pace (*Passus*), and one thousand paces (*Mille passus, Mille passuum, Milliare*) the Roman mile, about one hundred and forty-nine yards shorter than our English mile.

In speaking of the pace (*Passus*), a dangerous mistake has become current, in confounding it with the half-pace, or step (*Gradus*); while the pace is the passage (*Passus*) of a lifted foot to its next resting-place in walking. This distinction ought to be carefully observed, as considerable danger of a national blunder impends over us; books of some reputation which teach surveying, especially military sketching, having given their authority to the error.

Far more ancient than the Roman foot and pace is the Scriptural Cubit, which Moses, "learned in all the learning of the Egyptians," no doubt adopted from that nation, to which has always been ascribed the origin of mensuration. Moses had also learned from them the still more useful art of expressing words by characters which denoted sounds (Phonetic characters), which from him produced the written languages of Palestine, of Greece and of Italy, and derivately of all nations whose alphabet commences with A and B.

Those who believe that hieroglyphics denote any distinct meaning as a written language thus have to consider, that if they existed before the time of Moses, they were then accompanied by a more convenient mode of expression. But they did not exist till after the time of Moses, because the earliest monuments of Egyptian greatness, the Pyramids, exhibit no hieroglyphics; and as phonetic characters did not cease to exist thenceforward, those cumbrous emblems could not have been invented for the purpose of expressing language, but were contrived for some other purpose. The result is, that they were afterwards invented by the priests for the purpose of religious mystery; which, in conferring power and wealth on that numerous body of men, coincided with the seeming policy of the state. For the productive power of the soil of Egypt, irrigated by the Nile, was such that multitudes were nourished at small expense of labour; so that had not artificial labour been created, the well-fed, half-idle, population would not have failed to turn their thoughts to politics and sedition. Huge buildings, of no other value, were perpetually in progress to prevent this evil, which, with the great expense of the religious and military castes, retained a very numerous population in a wholesome state of subordination to the laws.

If the practice of public buildings commenced with the granaries of Joseph, when he re-modelled the Egyptian government and people* (1700 years before Christ), and endured till the extinction of the Ptolemaic dynasty (a few years before the Christian æra), this policy seems to have been systematically maintained. From that time imperial Rome, and afterwards Constantinople, consumed the superfluous corn and other products of Egypt; a nation which has ever since been under such foreign domination as has more than sufficiently precluded superfluity among its native inhabitants.

The cubit, or elbow measure, is the height of an extended middle finger, when the bent elbow rests on a flat surface; and the sacred cubit exceeds the usual measure of the actual cubit so taken. Dr. Arbuthnot's computation estimates the sacred cubit at one foot and nearly ten inches (1·9888), but Sir Isaac Newton, from the *Pyramidographia* of Greaves, fixes it indubitably at (1·8·628), one foot eight inches and nearly two-thirds.

It is a curious fact, that while the numeration of the Romans was decimal (by tens), they always divided their unit or integer into twelve parts; so that their *uncia* is equally the origin of the words "ounce" and "inch," while their year, day and night, equally exhibit a duodecimal division; and the imitation of this in an after-age was carried so far, that the Norman scribes, who compiled *Domesday Book*, oftener than once inform us, that the Saxons reckoned 120 (twelve tens) to the 100.

It is not easy to believe that the English foot (rude as we must suppose it to be in its origin) is founded on the Roman ounce weight, which renders the accidental coincidence the more extraordinary, in that 1,000 Roman ounces (Avoirdupois ounces) of water should exactly fill a cubic foot.

A modern attempt in France to alter established weights and measures appears in the foregoing tables, and has been so far successful, that it demands notice

* See the distinct narrative of this remarkable fact (the most remarkable in history) in the book of Genesis, chapters XLI. and XLVII.

in this place. During the fervour of the Revolution, the French Convention acted on the simple principle, that whatever was established ought to be overthrown; so that the number of days in a week and in a month, the names of the months, and the date of the Christian æra, were equally exploded; and the democrat philosophers did not fail to claim a decimal division of weights and measures. A decree to this effect was published in April, 1795; but it was not successful in superseding the customary divisions of all commodities into halves and quarters; and the inconvenience was found to be so great, that, in the year 1812, Buonaparte legalized a *Système usuel*, which has since been established by a royal decree in the year 1816, as the only legal system. But the metre, or philosopher's unit of measure, must be so far noticed, as to say that it is as eleven to ten compared to an English yard; in other words, that by adding one-tenth to any number of metres, you obtain the same measure in English yards; by deducting one-eleventh from a number of yards, you obtain the equivalent number of metres.

An attempt to improve English weights and measures took place in the years preceding 1826, when at last the legislature sanctioned the recommendation of certain persons to whom the investigation had been confided by a royal commission. They did not, indeed, alter the established long measure; but what board, what committee of inquiry can be expected to report that the inquiry has been useless, inasmuch as alteration would be injurious? The respectable corn measure of England, which dated from the time of Henry the Third (600 years since) was the victim on this occasion, and the legal bushel throughout the south of England became illegal, being superseded by a bushel increased by a thirty-second or thirty-third part, the exact difference not being easily appreciable. The *negative* result of the law has been, that after much expense incurred by the counties and towns which were constrained to purchase costly standard measures, these have never once been employed, the ancient bushel remaining in use universally as before; the *positive* result having been, that all previously acquired knowledge of the great national question of the corn laws was lost to the possessor of it and to the public, because the official returns before the year 1826 cannot now be easily compared with the returns of price, import and export since that time; and as these returns no longer represent the bushel in current use, every investigation of the corn law question is involved in a similar degree of confusion; while the new law can only be enforced in measuring commodities subject to the duties of customs or excise.

ROAD MEASURES OF LENGTH.		English Yards.	No. equal to 100 English Miles.
England	Mile	1,760	100·000
	Mile geographical	2,025	86·913
Ireland	Mile	2,240	78·571
Scotland	Mile	1,984	88·709
France	Kilometre	1,093	161·024
	Post-league of 2000 Toises,	4,263	41·285
	Marine league ($\frac{1}{20}$ of deg.)	6,076	28·966
Germany	Mile geographical	8,101	21·725
	Mile long	10,126	17·381
	Mile short	6,859	25·659
Holland	Mile	8,101	21·725
Prussia	Mile	8,237	21·367
Rome (Modern)	Mile	1,628	108·108
Rome (Anc.)	Mile passus	1,611	109·249
Rome	Mile geographical	2,025	86·913
Russia	Werst	1,167	150·814
Spain	League common	7,416	23·732
	League judicial	4,635	37·972
Sweden	Mile	11,700	15·042

LAND MEASURES, OF AREA.		English Square Yards.	No. equal to 10 English Acres.
England	Acre	4,840	10·000
Scotland	Acre	6,150	7·669
Ireland	Acre	7,840	6·173
Amsterdam	Morgen	9,722	4·978
France	Hectare	11,960	4·046
Prussia	Morgen	3,053	15·853
Rome (Modern)	Pezza	3,158	15·196
Rome (Anc.)	Jugerum	3,093	15·648
Russia	Dessetina	13,066·6	3·704
Spain	Fanegada	5,500	8·800
	Arranzada	4,623	10·469
Sweden	Tunneland	5,900	8·203
Vienna	Joch	6,889	7·025

TABLES OF MONIES OF ACCOMPT;

Their Value expressed in Pennies (Pence) Sterling, according to the Mint Price of Silver in England; namely, 5*s.* 2*d.* per oz. Standard.

		Pence.
England	Pound sterling	240
Scotland	Pound, Scots	20
Amsterdam	Rix-dollar	52·54
	Florin (old)	21·
	Florin (new)	20·72
	Pound, Flemish	124·32
Berlin	Pound, Banco	47·25
	Rix-dollar current, or Thaler	36·
France	Livre Tournois	9·58
	Franc (new system)	9·70
Munich	Gulden, or Florin	21·
Rome	Scudo, or Crown	52·05
	Scudo di Stampa d'Oro	79·37
Russia	Ruble	38·50
Spain	Real of old Plate (34 Maravedis Plate)	4·88
	The Spanish Dollar	51·79
Sweden	Rix-dollar	55·41
Vienna	Florin	25·20

Previously to the year 800, Charlemagne established throughout his extensive empire a Pound of silver (Troy weight), dividing this Pound or Libra of silver into twenty Solidi, or shillings, each shilling into twelve denarii, Deniers or pence; a method of computation which has also been adopted in England in the time of Edward the Confessor, and afterwards in Scotland. But although the division of the libra or pound into shillings and pence remains the same in the monies of accompt, the value of the pound has become very different in proportion as it has been depreciated by the necessities or dishonesty of various governments.

Thus the English pound has fallen in value to one-third (from sixty-two to twenty shillings); the Scottish pound to twenty pence, the French Livre (libra) to ten pence; the Libra of Spain differs in various provinces from twenty-seven to forty-eight pence English; and in most of the states of Italy the Lira expresses about eight pence English. The English penny has always been divided into halves and quarters, called the halfpenny and farthing (fourth-ing); and although the pound sterling has nearly superseded the Scottish pound in that ancient nation, their shilling (of the same value as the English penny) is still divided into twelfths, and in the last column of a money accompt is so denoted. The English mode of expressing our own halfpenny, farthing, and three farthings, is not a little troublesome, as requiring more time in writing, and more care in reading the farthing column accurately, than the more important columns which precede it. The expression of $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, is also inconvenient to the typographer, from disturbing the interspaces of lines, and from the minute type which is unavoidable; and it becomes worth while to consider whether such inconveniences ought not to be superseded by simply expressing the number of farthings, as of shillings and pence, without marking any denominator. Our forefathers were slow in dismissing Roman Numerals from their accompts; and when they adopted the Arabic notation, they

continued to incumber the columns with useless zeros, not considering that a zero, being of no value unless after some other figure, ought not to be designated otherwise than by a blank (—), because the appearance of 0, inaccurately written, leads the accomptant into danger of mistaking it for a 6. A specimen is subjoined of the ancient, modern, and proposed methods of expressing money accompts.

£. s. d.	£. s. d.	£. s. d.
15 : 01 : 10¾	15 „ 1 „ 10¾	15 , 1 , 10 , 3
22 : 16 : 07¼	22 „ 16 „ 7¼	22 , 16 , 7 , 1
06 : 05 : 11	6 „ 5 „ 11	6 , 5 , 11 ,
40 : 00 : 06½	40 „ 0 „ 6½	40 , – , 6 , 2
84 : 04 : 11½	84 „ 4 „ 11½	84 , 4 , 11 , 2

The figures in the last column of the proposed notation may be made rather smaller than the figures expressive of higher value, and separated from the pence by a comma, instead of the ceremony of making a cross line and denominator (2 or 4) of the fractional expression. Such abbreviation of each operation may appear unworthy of notice; but if multiplied by the number of such operations, and of the industrious classes of society who have daily occasion to write and keep small money accompts, the total amount of facility will resemble the effect of bringing into use a powerful machinery, with the same advantage of additional accuracy, and in an operation to which final accuracy is a quality of indispensable necessity.

[From the *Life of Telford.*]

THE DOUM TREE OF THE THEBAID.

Nucifera Thebaica.

This tree, although known to the ancients, appears never to have been noticed by Europeans in modern times until the expedition of the French into Egypt. It is a species of palm, but differs from the rest of its tribe in its mode of growth; the stem of nearly the whole of the palms is undivided, springing upwards in a straight line, but the Doum separates into several branches. The trunk, which rises to the height of thirty feet or more, is about three feet in circumference, and is divided into parallel rings, not particularly prominent, formed by the impression of the base of the leaf-stems which have fallen; the summit is divided into two branches, each of which afterwards divide and subdivide in pairs, three or four times, and each of the last of the ramifications is crowned with a tuft of from four-and-twenty to thirty palmated leaves of about six feet in length, resembling altogether a fan half opened.

The fruit of this tree is an oval berry, covered with a thin skin; it is about the size of a small pear, and has a single cavity containing a yellow pulp, of the flavour of honey, of an aromatic smell, and crossed by fibres; these uniting in the interior of the fruit, form nearly a woody covering for the seed, which consists of a large nut of a whitish colour.

The Doum is an extremely valuable tree in all the countries where it grows; according to Delile it is of much use in preventing the encroachment of the sands of the desert; many species of thorny shrubs, finding an asylum under its branches, gradually spread themselves in the neighbourhood, and form a kind of fence to protect the cultivated spots. The trunk of the Doum is formed, like the date tree, of longitudinal fibres, but is much more compact in its texture, sufficiently so to be formed into planks, which are used in the manufacture of doors and other carpenters' work; from the blackness of the fibres and the yellow colour of the intervening substance, the wood is far from inelegant. The leaves are used in the manufacture of mats, baskets, &c. The pulp of the fruit is fit for food, and would form a very agreeable aliment, were it not for the fibres by which it is interlaced; in spite of this disadvantage, however, it is frequently eaten by the inhabitants. A great quantity of the fruit is carried to Cairo, where it is sold at a low rate, but it is chiefly employed as a medicine; its taste is something like gingerbread, and the children eat it readily. A pleasant drink is also made from it. The nut itself, which is extremely hard, is turned in the lathe into various forms, and is capable of taking an excellent polish. We believe it is known in this country by the name of the Coquilla Nut.

Fruit of the Doum Palm.

CHILDHOOD.

Oh! Childhood is a holy thing,
When the young feelings first take wing,
And trace in all they hear or see,
An earnest of fidelity.
When all they love is warm and true,
And all they meet is bright of hue,
And all the world appears so fair,
'Tis only bliss to linger there.
When every thought is light with glee,
So fresh, so buoyant, and so free;
And hope's sweet blossoms, warmed and nurst
By vernal airs, in beauty burst;
When all they hear of care and guile,
Of man's deceit and woman's wile,
Seem but the dreams of tempers crost,
Of cankered minds and fancy lost;
And nature's landscapes as they pass,
O'er the young mind's unsullied glass,
Reflected there, in forms appear
Of loveliest shape, with lights most clear,
And pictured thus more soft and fine,
Present each rougher, harder line.

[*The Rubi, a Tale of the Sea.*]

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RUINS OF TINTERN ABBEY

TINTERN ABBEY,

MONMOUTHSHIRE

Yet still thy turrets drink the light
Of summer-evening's softest ray,
And ivy garlands, green and bright,
Still mantle thy decay;
And calm and beauteous as of old,
Thy wandering river glides in gold!

ALARIC A. WATTS.

In the centre of a sylvan valley, surrounded by solemn woods, stands TINTERN ABBEY, the glory of monastic ruins—the gem of the Wye. Of all the picturesque scenes along the course of that classic river, from its upland source in the wild blue hills of Cambria, to its junction with the turbulent and majestic Severn a little below Chepstow, this is one on which the mind loves to linger. How beautiful is that amphitheatre of green and wooded hills! What an air of peace does the valley wear! How sequestered from worldly turmoil. Surely this is the spot of all others for a structure dedicated to the worship of the Most High. Let us meditate upon thy changeful history, then, "holy Tintern*;" let us examine thy lofty, ivy-clustered arches, piercing the sky,—and slowly trace thy crumbling walls and gorgeous tracery, beauteous in decay

Tintern owes its origin to Walter Fitz Richard de Clare, who in 1131 founded a monastery here for monks of the Cistercian order, and dedicated it to the Virgin Mary†. Walter dying without issue, his brother, Gilbert de Strongbow, lord of Striguil and Chepstow, and first earl of Pembroke, succeeded him, and considerably augmented the endowments; confirming to the monks all the lands, possessions, liberties, and immunities, granted by his predecessor. He died in 1148, and was himself buried at Tintern.

* The name of Tintern, is supposed to be derived from the Celtic words *Din* a fortress, and *Teyrn* a sovereign; for it appears that a hermitage belonging to Theodoric or Tendric, king of Glamorgan, originally occupied the site of the Abbey. This royal hermit had resigned the throne to his son Maurice, and "led an eremitical life among the rocks of Dindyrn." It is remarkable, that two kings who sought Tintern as a place of refuge, should leave it to meet violent deaths; namely, Theodoric above mentioned, who was slain in battle by the Saxons, under Ceolwulph, King of Wessex, in the year 610, having been dragged by his subjects from his seclusion against his will, to act once as their leader; and Edward the Second who fled here from the pursuit of his Queen, Isabella. The Welch monarch is said to have routed the Saxons at Mathern, near Chepstow, where his body was buried, having received in the action a mortal wound on the head; Bishop Godwin says that he there saw his remains in a stone coffin.

† The Cistercians were a branch of the Benedictine order, and are supposed to have first established themselves in England, at Waverley, in Surrey, in 1128. They afterwards appear to have increased considerably, as, at the dissolution, the number of monastic edifices belonging to the Cistercian order amounted to seventy-five, thirty-six of the superior monasteries being of this rule. Tintern, from the date of its foundation, is considered to have been one of the earliest edifices erected for the use of the order.

His brother then took the estates, but the male line of the family failing, Matilda the heiress, married Hugh Bigod, Earl of Norfolk and Suffolk. His grandson, Roger Bigod, according to William of Worcester, afterwards became a great benefactor; and from the same authority we learn, that he founded and endowed the abbey church, which was consecrated for Divine service in 1287. His arms were accordingly placed in the east window.

At the period of the dissolution of monastic edifices, there were only thirteen inmates; a number probably suggested by the idea of our Saviour and the Twelve Apostles. Some writers have contended from this, that the monastery was at no time during the period that it flourished, celebrated either for the number of its religious, or the extent of its possessions. We are, however, inclined to follow old Chaucer, who says, "for threttene is a covent I guess," evidently meaning that thirteen was the ordinary number of monks appertaining to religious establishments in general. The annual revenues were valued, according to Dugdale, at 132*l.* 1*s.* 4*d.*; but Speed estimates them at 256*l.* 11*s.* The site was granted 28th Henry the Eighth, to Henry, second earl of Worcester; and is now the property of the duke of Beaufort, a lineal descendant of that nobleman. During the civil troubles in the reign of the unfortunate Charles the First, the roof was stripped of its lead, doubtless for military purposes.

The remains of this splendid example of Gothic architecture in its greatest purity, have, as may be supposed, excited universal admiration, and been extolled by many writers. Sir Richard Colt Hoare remarks, "this abbey, (as to the finest *coup d'œil,*) exceeds every ruin that I have seen in England and Wales;" and Archdeacon Coxe, speaking of Tintern in his *Historical Tour through Monmouthshire,* says, "the first impressions are those of grandeur and sublimity. But as these emotions subside, and we descend from the contemplation of the whole to the examination of the parts, we are no less struck with the regularity of the plan, the lightness of the architecture, and the delicacy of the ornaments; we feel that elegance is its characteristic no less than grandeur, and that the whole is a combination of the beautiful and sublime." Mr. Roscoe, in his *Wanderings,* is of opinion, that the exterior view is rather disappointing than otherwise; yet, "the lack of enthusiasm we feel while on the outside, seems to serve only as a greater enhancement of the glory within." We cannot quite subscribe to this opinion; on the contrary, we think that the view of the exterior, particularly that which bursts on the spectator at an angle of the road from Chepstow to Monmouth, is imposing and beautiful in the extreme, especially when viewed near sunset, on a fine evening in Summer, when the glorious luminary of day gilds with his departing rays the "storied windows," and elaborate tracery. This is also the best period to see the interior. The only drawback to the picture, on closely approaching the abbey, and which certainly destroys in some measure the pleasing associations that crowd upon the mind of the visiter to this ancient shrine of superstition and learning, are the shabby dwellings observable in the western vicinity of the abbey walls; but this after all is of minor importance, and has been dwelt upon by some writers more strongly than is strictly accordant with reality and truth.

Tintern by moonlight is solemnly grand; and the effect of the silvery beams of that planet, casting a mild radiance over the "wild secluded scene," may be imagined, but not described. Of the admirable effect of five architectural fabrics at such periods, a beautiful illustration occurs in the *Lay of the Last Minstrel,* in the well-known lines on the ruins of Melrose.

Reed, in his *Remains,* thus eloquently speaks of Tintern by moonlight:—

The great tree, or vegetable rock, or emperor of the oaks, (if you please,) before which I bowed with a sort of reverence in the fields of Tintern, and which for so many ages has borne all the blasts and bolts of heaven, I should deem it a gratification of a superior kind, to approach again with "unsandaled foot" to pay the same homage, and to kindle with the same devotion. But I should find amidst the magnificent ruins of the adjoining abbey, something of a sublimer cast, to interest and give poignancy to my feelings. I must be alone. My mind must be calm and pensive. It must be midnight. The moon half veiled in clouds, must be just emerging from behind the neighbouring hills. All must be silent, except the wind gently rushing among the ivy of the ruins. The river lulling by its faint murmurings its guardian genius to repose, and the owl, whose funeral shriek would sometimes die along the walls in mysterious echoes. I should then invoke the ghosts of the abbey; and Fancy, with one stroke of her magic wand, would rouse them from their dusty beds, and lead them into the centre of the ruin. I should approach their shadowy existences with reverence, make enquiries respecting the customs and manners, and genius and fate of antiquity, desire to have a glimpse of the destiny of future ages, and enter upon conversations which would be too sacred and even dangerous to communicate.

The conventual church, which forms the principal portion of the existing ruins, is a cruciform structure, built in the style of a cathedral, consisting of a nave, north and south aisles, transepts, and choir. Its dimensions are extensive:—the length from east to west measures two hundred and twenty-eight feet: and from north to south at the transepts, one hundred and fifty feet. The nave and choir are thirty-seven feet in breadth; the height of the central arches is seventy feet; of the smaller arches thirty feet; of the east window sixty-four feet; of the west window forty-two feet. The total area originally enclosed by the walls of the abbey, is said to have been thirty-four acres.

The exterior of the western front, especially on a near approach, is singularly striking; but on entering the interior through the western door, a scene of such solemn grandeur and beauty is suddenly opened, that even the most tasteless and indifferent beholders cannot but be very powerfully impressed by it. We feel in an instant that we stand upon holy ground.

When we stood at one end of this awful piece of ruin, and surveyed the whole in one view, (exclaims Gilpin,) the elements of air and earth, its only covering and pavement; and the grand and venerable remains which terminated both, perfect enough to form the perspective, yet broken enough to destroy the regularity, the eye was above measure delighted with the beauty, the greatness, and the novelty of the scene.

The walls of the Abbey Church are nearly entire; and most of the elegant columns which separated the nave from the south aisle are yet standing, as are the four lofty and magnificent arches, (though now reduced to mere skeletons of stone,) that formerly supported the tower in the centre. The columns that divided the nave from the north aisle have fallen, but the bases still attest their number and site. The shapes of the windows are little altered by time; though some are obscured by a luxuriant and graceful drapery of ivy, the tendrils of which twine in their tracery, creep along the walls, encircle the columns, and form natural wreaths around the capitals. The forms of the principal windows are, however, yet so far preserved, as to be easily discriminated; the tracery of the western

window in particular, is singularly exquisite; and the light and graceful eastern window, occupying almost the whole breadth of the choir, with its slender, umbilical shaft rising to a height of fifty feet, diverging at the top into rich tracery, has quite a magical effect. Several of the other windows are also, more or less, richly adorned. The roof of this venerable edifice has long since fallen;—the vault of heaven alone forms its canopy, and the "flower of the field" constitutes its pavement, the flooring of enamelled tiles having been removed by the hands of the sacrilegious spoiler. The solemn melancholy of the deserted fane is occasionally disturbed by the whooping of some solitary owl, or the chattering of restless jackdaws, which singularly enough desert at certain intervals their ivied haunts, and again return at regular periods to their ancient home. The interior is kept very neat and trim; the turf, which is carefully mown, being strewn with the ornamented fragments of its former magnificence, and the sepulchral relics and mementos of its ancient benefactors and possessors. Among these mutilated effigies is the figure of a knight in chain-armour, a *pavache* shield, and crossed legs, as a Crusader, or a vowee to take the Cross. This figure has been ascribed to Gilbert Strongbow, first Earl of Pembroke, a celebrated warrior of the time, upon the authority of the Abbey chronicle which mentions his interment here; Sir S. R. Meyrick, however, considers the effigy to be that of Roger de Bigod, Earl of Norfolk. The rude sculpture of the hand has given rise to the opinion that he had five fingers and a thumb on his right hand. How forcibly do these time-worn emblems of a by-gone age remind us of the beautiful and impressive language of Scripture! "One generation passeth away, and another generation cometh;" and "verily every man at his best state is altogether vanity."

By means of steps, rails, and planks, all travellers, even the most timid female, may safely inspect the interior of the Abbey in every part. A circular stone staircase, in excellent preservation, leads the visiter to the summit of the north transept, but there is nothing particularly striking from this point; the majestic grandeur of the ruin is indeed seen to most advantage from the ground. There are some remains of the refectory on the north side of the church, and an oratory adjoining, is supposed to have been used for saying grace at the time of meals. Vestiges of the dormitory, and several other apartments, may also be observed. Some picturesque remains near the river side, are supposed to have been the Abbot's lodge: and others which formed the cells of the monks have been converted into cottages for the poor.

Tintern Abbey Church, according to Dugdale, "is in all its parts, a unique whole, a copy of Salisbury cathedral, built only a few years before;" and there is also said to be a great resemblance between this Abbey and Netley, which was erected in the same era. There appears to be some doubt whether the church was completed in the thirteenth century, as the great eastern window is in the style of the succeeding one.

The extreme neatness in which the ruins are kept, has been objected to, as quite inconsistent with the air of solemn desolation indispensible in a ruined religious edifice, and the removal of the monuments in clearing the interior, has been pronounced "foolish and injurious, and as answering no purpose." Whatever truth there may be in the latter allegation, with regard to the former, it is abundantly evident that the highest credit is due to the noble owner of this venerable pile, for the steps that have been taken to secure it from further dilapidation*; for though the destroyer has dealt leniently with it, yet if we look to the ravages that have been made, and we grieve to say are still making, in many other of the beautiful and interesting ruins that adorn this island in almost every part, and which form such distinguishing features in British scenery, we cannot but have reason to be grateful, in common with every admirer of ecclesiastical architecture in its noblest form.

In concluding our account of this "seat of devotion, solitude, and desolation," we cannot do better than sum up in the impressive language of Bucke†: —"As the Abbey of Tintern is the most beautiful and picturesque of all our Gothic monuments, so is the situation one of the most sequestered and delightful. One more abounding in that peculiar kind of scenery which excites the mingled sentations of content, religion, and enthusiasm, it is impossible to behold. There every arch infuses a solemn energy, as it were, into inanimate nature: a sublime antiquity breathes mildly in the heart; and the soul, pure and passionless, appears susceptible of that state of tranquillity which is the perfection of every earthly wish."

ON THE LEAVES OF PLANTS.

To the account already given‡ of some of the organs by which plants are nourished, we now add a few plain directions for dissecting certain parts of plants.

For the purpose of minutely examining the structure of vegetables, a microscope of a highly magnifying power is necessary, and an extreme delicacy of hand which falls to the lot of but few. Some of the component parts of a leaf are, however, easily shown, if only common care be employed in their preparation, and nothing can form a more beautiful object than a well dissected leaf or seed-vessel.

The method of preparing these objects of natural history is extremely simple. Leaves of various plants, such particularly as the thistle, holly, willow, and many others, and the seed-vessels of the winter-cherry, poppy, &c., are to be gathered at that time of the year when they are perfectly mature, and their fibrous parts in their state of greatest hardness. They are to be laid in a large, shallow, earthenware vessel, such, for instance, as a cream-pan or a large dish; they are then to be kept covered with clean water, and as often as the colouring matter in the leaves has stained the liquor, it is to be removed, and fresh water poured over them§.

After a few weeks, (but the time depends on the warmth of the weather,) the leaves may be taken out singly, and laid on a smooth plate of glass, the green

* It is only justice to note, that nearly all the splendid ruins belonging to the Duke of Beaufort, are kept in a high state of preservation; and much credit is due to Mr. Wyatt, his grace's agent, for the attention he bestows upon them.

† In *The Beauties, Harmonies, and Sublimities of Nature.*

‡ See *Saturday Magazine*, Vol. V., p. 116.

§ The best method of removing the water, without disturbing the leaves, is by means of a small siphon, a bent tube, with one leg longer than the other; fill this tube with water in the following manner: Hold the siphon in your left hand with the bent part downwards, then pour in water until it rises to the level of the opening of the short leg, then stop the open end of that leg with your finger, and continue to pour water in until the longer leg is full; now reverse the siphon, still keeping the opening of the short leg well stopped, and hang it over the edge of the vessel with the short leg plunged in the water; the finger may now be removed, and the water will flow up the short leg over the arch of the siphon and down the long leg, and it will continue to flow as long as there is sufficient depth of water to allow the opening of the short leg to be immersed without touching the bottom of the vessel. A piece of sponge will answer nearly as well, by first allowing it to take up as much water as it can, and then squeezing it out.

skin with which they are covered will be found sufficiently softened to allow of the removal of a portion of it, by gently wiping it with the finger or a camel-hair pencil; a basin of clear water will be useful to rinse the leaf after this operation, and remove the loose pieces of green matter. The leaf is then to be returned to the flat vessel, and allowed to remain a few weeks longer, to loosen such parts of the skin as could not be removed in the first instance. If this operation has been carefully performed, a beautiful skeleton of the leaf will be the result.

LEAF OF THE HOLLY.

This should then be placed between leaves of dry blotting-paper, to extract the moisture, and then carefully dried under a gentle pressure, unless the nature of the leaf requires that it should be dried in a curled position.

This mode of preparing a leaf will be successful with most people; but a more delicate and beautiful preparation may be made if greater skill be brought to the task, and greater care taken in the delicate dissection. The skeleton, or woody part of the leaf, is, in reality, in three layers, and these may in some cases be separated and properly displayed, as here shown. The two outer layers of this preparation

are the thin green skin, or epidermis, and require great care in their dissection; the other, or central layer, consists of a double series of vessels, having all the appearance of veins and arteries, differing in size and in colour, and inosculating with others, that is, the finer extremities or mouths of each are united. If the water in which the leaves are steeped is made slightly acid by the addition of a little sulphuric acid, the process will be hastened, but there is some danger of injury to the skeleton by the action of the acid.

Envy is a passion actually diabolical in its nature, for it makes war against God himself; and being incapable in its impotence of clouding his Sovereign Majesty, it attacks him in the gifts his beneficence has bestowed on man.—*Book of the Fathers.*

ON WRITING MATERIALS

No. IV.

History of Writing Paper.

From the first hour that men perceived the advantage and necessity of recording their thoughts in such a form that distant countries and future times should possess the power of interpreting them, it is obvious that a material was to be discovered, which should permit the written symbols to be marked upon it in a legible form, and which should, at the same time possess such a degree of durability as would enable it to withstand the operation of conveyance from place to place, and would preserve it from decomposition and destruction by vicissitudes of climate.

The materials which were used for this purpose in the early ages, and indeed, down to the time of the invention of paper, were palm-leaves, inner-bark, papyrus, waxed tablets traced with a style (such as we have before alluded to), skins, lead, cloth, silk, &c. The ancients were not accustomed, at first, to arrange their leaves into the form of a square book, as is customary with us, but when they had more to write than would fill one skin or leaf, they sewed several together, and wound them on a centre stick. Many specimens of this kind were found in the ruins of Herculaneum. They were burnt to a cinder, and looked much like petrified wood; some of them, however, were capable of being separated sufficiently to examine their structure. They were found to consist of small sheets, or pieces, about the size of the hand, and pasted together edge to edge, so as to form one long sheet.

The Egyptian paper, of which these were formed, was made of a rush or reed called *papyrus*, or *biblus*, growing chiefly in Egypt, on the banks of the Nile. In the preparation of this reed into paper, they cut off the two extremities, viz. the head and root, as being of no use in the manufacture. The stem was then slit lengthwise into two equal parts; and from each of these the thin scaly coats or pellicles, of which the reed consisted, were stripped with a sharp instrument: the innermost skin was considered the best, and the outermost the worst in quality, and thus were formed films of different value. Pliny gives names to twelve different kinds or qualities of these films. As the films were removed, they were laid out flat upon a table; then two or more of them were laid across each other transversely, so that their fibres should lay at right angles. In this state they were glued, or fastened together by being dipped into the muddy water on the banks of the Nile, which was found to make them adhere together. The water was then pressed out, and the films left to dry; after which, they were pressed and beaten with mallets, to obtain a smooth surface: this then constituted Egyptian paper. In those provinces or countries where the waters of the Nile were not at hand, the films were connected together by means of a paste much resembling our flour-paste. It is supposed that the mode in which the water of the Nile acted as a cement, was by dissolving certain viscid or gummy matters contained in the reed. The city of Alexandria was the great paper mart of Egypt.

At the time when the Egyptians, and other countries with which they were in communication, used the papyrus, more distant nations formed their paper from the *liber*, or inner, whitish rind, enclosed between the outer bark and the wood of certain trees, —such as the elm, maple, beech and plane, and particularly the linden tree. This rind was stripped off, flatted, and dried, and was then considered to be fit for writing on; but it was much inferior to the

Egyptian papyrus. *Liber* is the Latin word for *a book*, and from this we get our modern term *Library*.

In China, paper is made of the rind or inner bark of the mulberry, the elm, the bamboo, the cotton, and other trees. These rinds undergo a process very different from what we have yet described.

As the processes are nearly alike for the different kind of trees, we will select bamboo paper as an example.

The bamboos, which are three or four inches thick, are deprived of their leaves, cut into pieces, four or five inches long, and steeped for some days in water. When softened, they are washed in pure water, put into a dry ditch, and covered with slaked lime. They are again washed; and after being cut into small filaments, the whole are exposed to the sun to dry and bleach. The filaments are then boiled, and afterwards reduced to a fine pulp by a process of beating. Some shoots of a plant called *Koteng* are steeped in water, by which they acquire a glutinous consistency, and in which state they are added to the bamboo pulp.

The whole mixture is then beaten together in mortars, until it acquires the consistency of a thick, viscid liquid. It is then poured into large tubs or reservoirs; into which the paper-maker dips the frame or mould which is to give the proper size to the sheet of paper. On this frame he takes up as much pulp as will make one sheet. The thin layer of pulp is then dried by being placed against the smooth surface of a stove, or hollow heated wall. The pulp leaves the mould and adheres to the wall; from whence it is easily removed when dry. The paper is in this state too absorbent to receive ink or colour; it is therefore dipped in a liquid solution of isinglass and alum.

Paper has been made of asbestos, a very remarkable mineral, which may be exposed to a great heat and intense flame without being burned. It is a greenish, gray, fibrous stone, which is found in large quantities in Corsica. Professor Bruckmann, of Brunswick, wrote a treatise on the manufacture of paper from asbestos, and printed four copies of the work on paper of that kind. Mr. Lloyd described in the *Philosophical Transactions*, the mode in which he himself had been enabled to make incombustible or asbestonic paper. He pounded a quantity of the asbestos in a mortar till it became a downy substance; then sifted it in a fine sieve, by which the stony and earthy matters were sifted through, in the state of powder, leaving the fibrous asbestos in its downy state. The asbestos was then put into water, and stirred well up in it, and poured into a flat mould, much in the same manner as the Chinese paper. The result was a paper neither very fine nor very strong, but one that was incombustible. The advantages of this paper do not seem however to have been valued at a very high price, for its manufacture has not been persisted in.

There are many interesting particulars relating to parchment which will occupy a future article; but we may remark that about the tenth or twelfth century, manuscripts which were formerly written on parchment, began to be written on a paper made of cotton. There are many MSS. in the library of the king of France written on cotton paper; but the mode in which this paper was made, does not appear to be now known.

We now come to that important species of paper, whose production has been so beneficial to mankind, —we mean linen paper. It has been said that the incalculable advantages which the moderns have derived from the art of printing, would have been only imperfectly known, but for the invention of making paper out of our old and tattered linen garments.

At what time linen paper was first made is a matter of dispute, but it appears to have been first employed among us about 500 years ago; but for a long time after its invention, this country obtained its supply from abroad. The only sort made in England until about 1690 was the coarse brown paper; but as the war with France occasioned very high duties to be laid on foreign productions, some French protestant refugees settled in England, and introduced the manufacture of white writing-paper. This manufacture soon arrived at great perfection in England; insomuch that 300,000 reams of paper were made in England in 1721. At the present day it is computed that the value of the paper made in England is about 1,300,000*l.* There are about 700 paper mills in England, and 80 in Scotland, which employ about 27,000 persons in the direct manufacture; besides those engaged in erecting the mill-work, and other machinery.

Of the linen rags of which paper is made, about three-fifths of that which is used in England is imported from foreign countries, principally from Italy, Germany, Hungary and Sicily, the exportation of rags being prohibited in France, Holland, Belgium, Spain and Portugal. The imported rags arrive in England in close bags, each bag being marked to indicate the quality of the rags contained in it. The rags are taken to the mill, where a further sorting takes place, before the process of paper-making commences.

We will now briefly describe the different kinds of paper made in England at the present day.

Writing and *Drawing* papers are those on which the greatest care is bestowed. The principal distinction in these papers is between the *laid* and the *wove* papers: the former exhibiting the lined watermarks, derived from the wire-work of the mould in which they are made; while the latter are perfectly smooth and even, in consequence of the mould in which they are made being constructed of very fine copper wire, woven into a sort of cloth:—hence the name. A difference of colour is observable in writing-paper; the yellow is nearly the colour of the rags from which the paper is made, but the blue tint is given by the mixture of smalt (powder-blue) with the pulp. We frequently see in blue wove writing-paper, that one side is bluer than the other; this arises from the smalt sinking to the bottom of the pulp, and dyeing the lower surface deeper than the other. The general terms by which the qualities (independently of the sizes) of writing-papers are known are *laid, yellow-wove,* and *blue-wove;* and they are almost uniformly done up in quires of 24 sheets each, 20 of which quires make a ream. The sizes of the sheets of Drawing or Writing paper, go through a range of nearly thirty different sizes from *pott* paper, of which the sheet is 15½ inches by 12½, to a kind which is called *antiquarian*, of which the size is 52½ inches by 30. The common letter-paper, as sold in the shops, however, is seldom of the size in which the sheets are made. There are about a dozen different kinds of post paper, of which the sheets are made, on an average, about 21 inches by 16: these are cut into two halves, and then folded, and the edges cut smooth; in which form they constitute the common *Bath post* of the stationer. Those writing-papers which are gilt or blacked at the edge, undergo those processes after the folding and cutting have been performed.

Those which we have above described are the papers used for drawing or writing; but a different

kind is employed by the printer. The printing-paper used for copper or steel-plate impressions is similar in sizes to the drawing-paper; but it is of a soft and absorbent nature, which is occasioned by the absence of the size which is used to stiffen drawing and writing papers; though when the plates are to be subsequently coloured, drawing paper is generally employed. Those copies of an engraving which are called *proofs*, and which are the earliest printed and the most costly, are taken on a very thin paper, laid on the usual print paper. This thin paper is *China* or *India* paper, and is brought to this country in sheets upwards of four feet long by two feet wide: it has a softness and pliability which enables it to take an impression from the finest lines of an engraving, and in so equable a manner that the representation becomes an exact type of the engraved lines on the plate. There is very little size in printing-paper, because the ink which printers use does not run in the way which common ink would. The effect of size in preventing the ink from spreading on paper is clearly shown by the action of blotting-paper, in the manufacture of which no size is used; as soon as a spot of ink touches this paper,—particularly the white variety,—the ink is instantly absorbed into the substance of the paper: it is for this reason that it is so universally employed to hasten the drying of a newly written sheet of paper. There is a kind of tissue paper which acts much in the same way, and is known as copying post: it has no size in its construction. When a sheet of paper is written on with an ink made for that express purpose, a sheet of this copying-paper is laid upon it, and the two are subjected to pressure, which causes an impression of the writing to be left on the copying-paper. This contrivance is sometimes used in mercantile houses, where copies of letters are necessary to be retained.

The *card paper* with which playing-cards are made, is generally brought from Genoa, a small part only of that which is used for this purpose being made in England; although the price of the English card is much less than that of the Italian.

Marbled papers are prepared in a curious way. A shallow trough contains gum tragacanth dissolved in water; and the surface of the gum-water is sprinkled with colours. These colours are any of the usual pigments, mixed up with ox galls, and are sprinkled on the surface of the water with a brush, one colour at a time. When all the required colours are sprinkled, the workman draws a stick to and fro in the water, to arrange the colours into any fantastic form; and to increase this effect, a comb, about five inches long, is drawn along the surface, by which the colours, on account of the glutinous nature of the gum-water, are dragged out of their original position and thrown into various forms. The sheet of paper to be marbled is then dexterously laid on the surface of the liquor in the trough, so that one side shall touch the coloured surface of the gum-water in every part; it is then taken out, and placed in some convenient place to dry. Much tact is required in this operation.

In our next article we shall describe the modes of making paper.

If men were content to grow rich somewhat more slowly, they would grow rich much more surely. If they would use their capital within reasonable limits, and transact with it only so much business as it could fairly control, they would be far less liable to lose it. Excessive profits always involve the liability of great risks, as in a lottery, in which there are high prizes, there must be a great proportion of blanks.—Wayland.

HARVEST.

Now o'er his corn the sturdy farmer looks,
And swells with satisfaction to behold
The plenteous harvest which repays his toil.
We too are gratified, and feel a joy
Inferior but to his, partakers all
Of the rich bounty Providence has strewed,
In plentiful profusion o'er the field.
Tell me, ye fair, Alcanor tell me, what
Is to the eye more cheerful, to the heart
More satisfactive, than to look abroad,
And from the window see the reaper strip,
Look round, and put his sickle to the wheat?
Or hear the early mower wet his scythe,
And see where he has cut his sounding way,
E'en to the utmost edge of the brown field
Of oats and barley? What delights us more,
Than studiously to trace the vast effects
Of unabated labour? To observe
How soon the golden field abounds with sheaves?
How soon the oat and bearded barley fall,
In frequent lines, before the keen-edged scythe?
The clatt'ring team then comes, the swarthy hind
Down leaps, and doffs his frock alert, and plies
The shining fork. Down to the stubble's edge
The easy wain descends half built, then turns,
And labours up again. From pile to pile
With rustling step the swain proceeds, and still
Bears to the groaning load the well-poised sheaf.
The gleaner follows, and with studious eye
And bended shoulders traverses the field,
To cull the scattered ear, the perquisite
By heaven's decree assigned to them who need,
And neither sow nor reap. Ye who have sown,
And reap so plenteously, and find the grange
Too narrow to contain the harvest given,
Be not severe, nor grudge the needy poor
So small a portion. Scatter many an ear,
Nor let it grieve you to forget a sheaf,
And overlook the loss. For He who gave
Will bounteously reward the purposed wrong
Done to yourselves; nay, more, will twice repay
The generous neglect.—Hurdis.

Let not any one say he cannot govern his passions, nor hinder them from breaking out and carrying him into action; for what he can do before a prince or a great man, he can do alone, or in the presence of God if he will.—Locke.

Whatever difficulties you have to encounter, be not perplexed, but think only what is right to do in the sight of Him who seeth all things, and bear without repining the result.—*The Original.*

If there be one thing more surprising than another in the investigation of natural phenomena it is perhaps the infinite extent and vast importance of things apparently little and insignificant. When we see an insect, smaller perhaps than a mite, moving with agility across the paper on which we write, we feel as incapable of forming any distinct conception of the minutiæ of the muscular fibres which effect these movements, and of the still smaller vessels by which they are nourished, as we are of fully apprehending the magnitude of the universe, and one of the last conclusions at which we arrive is the conviction that the greatest and most important operations of nature are conducted by the agency of atoms too minute to be either perceptible by the human eye, or comprehensible by the human understanding. We cannot better conclude than in the words of Mr. Ellis, who thus expresses his feelings in his beautiful History of living Corallines. "And now, should it be asked to what end has so much labour been bestowed on this subject, I can only answer, that as to me these disquisitions have opened new scenes of wonder and astonishment in contemplating how extensively life is distributed through the universe of things, so is it possible the facts here related may excite the same ideas in others, and we may learn that if creatures of so low an order in the great scale of nature are endued with faculties that enable them to fill up with so much propriety their sphere of action, we likewise who are advanced so far above them, owe to ourselves, and to Him who made us and all things, a constant endeavour to acquire that degree of rectitude and perfection to which we are also endued with faculties of attaining."—Buckland.

CORONATION ANECDOTES. No. VI.

Edward IV.

This monarch had his title confirmed by the forms of a popular election. Immediately after his victory over Henry VI., he came to London, and returned thanks to God at St. Paul's church. He was then conducted in solemn procession to Westminster, and placed on the King's Bench, in the Hall, which was filled with people. His claim to the throne was stated to be twofold,—first, as son to Richard, duke of York, the rightful inheritor of the realm; secondly, by authority of parliament, and forfeiture committed by King Henry. It was then demanded of the commons whether they would accept this prince to be their sovereign; to which all assented. He was crowned by Archbishop Bouchier, June 29th, 1461.

Lady Elizabeth Gray was crowned as Edward's queen by the same archbishop, May 26th, 1465. In her previous procession through London, she rode in a horse-litter, escorted by a great number of knights.

Edward V.

Preparations were made for the coronation of Edward V., but the barons and commons refused to accept any of the late king's sons as their sovereign, and tendered the crown to Richard, duke of Gloucester, who accepted it with affected reluctance.

Richard III.

Richard III. and his queen, Anne, daughter to the earl of Warwick, were crowned on the 5th of July, 1483, "With the selfe same provision," says Grafton, "that was appointed for the coronation of his nephew." It is exceedingly probable that this unfortunate prince bore a part in the procession, for on the coronation roll there is an entry for the charge of his dress. Seventeen knights of the Bath were created upon this occasion, and the concourse of nobles in the ceremony was greater than usual. The whole scene is described at great length by Hall, but the following particulars are alone worthy of notice. The king and queen received the sacrament from the hands of the cardinal archbishop of Canterbury, and one host, or consecrated wafer, was divided between them. The peeresses in attendance on the queen were very numerous, and no less than three duchesses of Norfolk were present. The coronation feast was celebrated with great pomp. Holinshed says, "About foure of the clocke, the king and queene entered the hall, and the king sate in the middle, and the queene on the left hand of the table, and on everie side of her stood a countesse, holding a cloth of pleasance when she list to drinke."

Henry VII.

Henry VII. was crowned October 30th, 1485, and his queen, Elizabeth, October 30th, 1487. The latter was remarkable for the procession by water from the palace of Greenwich to the Tower, instead of from Westminster, as was usual; but no other alteration was made in the order of this aquatic spectacle. The queen was escorted by the lord mayor, sheriffs, and the heads of the different companies in their state barges, richly ornamented with silken pennons and streamers, and also with the banners of the different trades, on which their arms were embroidered in gold. One of these barges, called the bachelors' barge, contained an extraordinary pageant, an enormous red dragon which spouted streams of fire into the Thames. The yeomen of the guard, and the royal musicians, were brought up the river in open boats, and the flourish of the trumpets, clarions, and other instruments, when the queen embarked at Greenwich, might be heard at London Bridge. The banks of the river were thronged with multitudes of gratified spectators, and the crews of the numerous foreign vessels which Henry's patronage of commerce had brought into the Thames expressed their admiration of the splendid spectacle by tumultuous shouts of applause. When the queen rode through the city on the following day, choirs of children dressed as angels were stationed in different places, who sang hymns and songs as she passed by. After the coronation an unfortunate accident occurred; the rabble scrambled for the cloth on which the queen walked from the Hall to the Abbey, and in the crush several persons were trodden to death.

Henry VIII.

Henry VIII. was extremely fond of pageantry, and he was particularly anxious about the ceremonials of his coronation. The Londoners seconded his desires, and when, after having created twenty-four knights of the Bath, he rode through London from the Tower, June 22, 1509, the streets were hung with tapestry and cloth of arras, and a great part of the south side of Cheap and part of Cornhill were hung with cloth of gold. The several companies and civic dignitaries lined the streets, and Hall tells us, "The goldsmiths' stalls unto the end of the Old Change, being replenished with virgins in white, with branches of white wax; the priestes and clearkes in rich copes, with crosses and censers of silver, censing his grace and the queene also as they passed. His grace wore in his uppermost apparell, a robe of crimsin velvet, furred with ermins, his jacket or coat of raised gold, the placard imbrodered with diamonds, rubies, emerauds, great pearles, and other rich stones, a great bauderike about his neck of great balasses. The trapper of his horse damaske gold, with a deepe purple of ermins. His knights and esquires for his bodie in crimsin velvet; and all the gentlemen with other of his chappell, and all his officers and houshold servants were apparelled in scarlet. The Queene Katherine was sitting in hir litter, borne by two white palfries, the litter covered and richlie apparelled, and the palfries trapped in white cloth of gold; hir person apparelled in white satin imbroidered, hir haire hanging downe to hir backe, beautifull and goodlie to behold, and on hir head a coronall set with manie rich orient stones."

The coronation was celebrated with brilliant "justs and turneies," which the king and queen witnessed from "a faire house covered with tapestrie." The pageants exhibited are thus described by Hall. "In the palace was made a curious founteine, and over it a castell, on the top thereof a great crowne imperiall, all the imbatelling with roses and pomegranats gilded. Under and about the said castell, a curious vine, the leives and grapes thereof gilded with fine gold, the walles of the same castell coloured white and green losengis, and in everie losing, either a rose or a pomegranat, and a sheafe of arrowes, or else K and H gilded with fine gold, with certeine arches and turrets gilded to support the said castell. And the targets of the arms of the defendants, appointed for the said justs, thereupon sumptuously set. And out at several places of the said castell, as well on the daie of the coronation, as on the daies of the said justs and turneies, out of the mouths of certeine beasts or gargels did run red, white, and claret wine."

After a flourish of trumpets a castle was brought in, supported or drawn by men, containing a lady habited as Pallas, "bearing a shield of christall." This pageant was brought before the king, to whom Pallas presented the knights dependant as her scholars, and requested that his majesty would permit them to defend the lists against all comers, which request was readily granted.

Another band of horsemen now entered, escorting eight knights, "armed at all points, with shields of their owne armes, with rich plumes, and other devises on their head-pieces, their bases and trappers of tissue, cloth of gold, silver and velvet." These were presented to the queen by a gentleman who declared that they were come "to doo feats of armes for the love of ladies," and besought her "to license these knights to prove themselves against Dame Pallas' scholars." The justs then commenced, and were continued until night, but it was not decided to which party the prize of victory belonged.

On the second day a curious pageant was exhibited by the queen's knights. When they entered the lists, there came after them "a number of hornes blowne by men apparelled in greene cloth, with caps and hosen of like sute, like foresters or keepers, and a pageant made like a parke, paled with pales of white and greene, wherein were certeine fallow deare, and in the same parke curious trees made by craft, with bushes, fernes, and other things in like wise wrought, goodlie to behold. The which parke or devise being brought before the queene, had certeine gates thereof opened, the deare ran out thereof into the palace, the greie-hounds were let slip and killed the deare, the which deare so killed, were presented to the queene and the ladies by the foresaid knights."

These knights now proclaimed themselves servants of Diana, who had heard accidentally while hunting that the scholars of Dame Pallas were in these parts, with whom they were anxious to prove their valour in a combat to the utterance. The king suspected that there was some grudge between the parties, and refused his consent, but he awarded that "they should tourneie together, giving but some certaine strokes, which done they departed, and so these justs brake up, and the prises given to everie man after his deserts."

The coronation of Lady Anne Boleyn, June 1, 1533, was equally splendid; the most remarkable portions of it were the pageants erected to honour her procession through the city. In Fenchurch-street, children in the habits of foreign merchants, welcomed the queen to the city with addresses in French and English. In Grace-church street was a pageant representing Mount Parnassus and the fountain of Helicon, which fountain, with more regard to splendour than classic propriety, poured forth streams of Rhenish wine. On the top of the hill sat Apollo with the Muses round him, playing on appropriate instruments, and at the feet of each muse were epigrams in golden letters, in which every Muse "according to her propertie praised the queene."

In Leadenhall-street there was "a goodlie pageant with a type and a heavenlie rose, and under the type was a roote of gold, set on a little mounteine, environed with white roses and red; out of the type came downe a falcon all white and sat upon the roote, and incontinent came downe an angell with great melodie, and set a close crowne of gold on the falcon's head." Saint Anne and her family were represented in the same pageant, and one of the children made an oration to the queen. The three Graces sat on the Conduit in Cheap, which ran with wine. Pallas, Juno, and Venus, accompanied by the god Mercury, were rather inappropriately intermingled with the civic authorities; and when the recorder presented the queen with a thousand marks of gold, Mercury, in the name of the goddesses, gave her a ball of gold, divided into three, "signifieing the three giftes, which the three goddesses gave to hir, that is to saie, wisedome, riches, and felicities." The four cardinal virtues having been banished from the city, took their stand upon four turrets erected over the conduit in Fleet-street, just outside Fleet-street. The melodious music of the ladies who represented the virtues "seemed to be an heavenlie noise, and was much regarded and praised, and beside this the said conduit ran wine, claret and red, all the afternoon." The ceremony of the coronation and subsequent feast, need not be described. "On Mondaie were the justs of the tilt, before the king's gate, where the maior and his brethren had a goodlie standing; but there were verie few speares broke, by reason the horsses would not cope."

WATER PROCESSION FROM WESTMINSTER TO THE TOWER.

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SOME ACCOUNT OF THE CITY OF ROME. Part IX.

PALACES.

"An Englishman travelling in Italy," says Dr. Burton, "must divest himself of the idea which he usually attaches to the word *palace*. In our country we understand by it the residence of royalty, and affixing ideas of magnificence to the term, we often complain of being disappointed with the foreign palaces; whereas in our own country it is the general observation that the royal palaces are inferior to private houses. In Italy the residence of every nobleman is called a palace; in Rome they are abundantly frequent; and if a concise description were demanded of them, it would not be far from the truth to say, that with a splendid outside, they display a lamentable want of comfort and inattention to cleanliness in the interior. The plan is nearly the same in all of them; they are built round a quadrangle with a large staircase opening into the court: the rooms communicate with each other, sometimes round the whole of the quadrangle, and form a suite of apartments on each floor, sufficient to constitute a house. But with all this scale of splendour, there is little, or nothing, in a Roman palace worth seeing, except the works of art. Even this attraction has been diminished in latter times, the poverty of the nobles having compelled many of them to sell their pictures. That splendour of furniture and decoration which characterizes the English houses, whether in town or country, is unknown at Rome."

Mr. Mathews' general account of the palaces of Rome is contained in a few words, "splendid and useless;" he says "the owners live in a few obscure rooms, and the magnificent galleries are deserted." Forsyth says of them that they are built rather for the spectator than the tenant. Hence the elevation is more studied than the plan. "Some of them are mere fronts, *facciate*," said a friend of mine "*con mobilia e quadri dietro*," (fronts, with furniture and pictures behind.) Their fronts, too, are so crowded with stories, that the mansion of a prince often suggests the idea of a lodging-house. The lower file of windows is grated like a gaol: the upper files are divided by wretched *mezzanini*. Where different orders are piled in front, which is fortunately rare, their natural succession is seldom observed: it is even reversed." Their internal arrangement is generally the same. A grand staircase leads into the *sala*, the common hall of the palace; and if the owner be a prince who has the right of canopy, in this apartment stands his throne with a railing round it. "From this great Hall, when it occupies the middle of the first floor, you command the palace in different directions, and can pierce it at a glance through lengthening files of marble door-posts. In the distribution of the houses, the great object is the picturesque. Nothing is done for the comfortable, which is a term unknown to the Italian language, and a state unfelt in a hot country."

Mr. Rae Wilson describes the internal decorations and furniture of the Roman palaces as being in most cases unsuitable to their size and stately appearance: "These noble residences," he says, "exhibit more of stateliness and grandeur than of positive beauty in their architecture; and as to external elegance, hardly one can lay any claim to it. They are in a grandiose but heavy style, and the thick iron gratings before the lower windows of many of them have a gloomy, gaol-like appearance. Besides this there are very few of them suitably finished, or indeed that do not betray, more or less, either sad neglect, or the utter inability of their owners to keep them in order and repair. Sordid meanness seems to go hand-in-hand with prodigality—penury with ostentation. In capacious saloons whose walls are decked with valuable paintings, may be seen furniture of the most ordinary description; and in apartments that are otherwise handsomely and consistently decorated, the eye is offended by the floor being of brick or of some composition of brick-like hue. Climate is no apology for such vile materials as these, because, if coolness be the object, marble, or at least stone, should be employed; else as a substitute for carpets, floor-cloth, painted either in imitation of them, or of inlaid marble floors. If such matters are not worth attending to, neither can it be worth while to bestow any thought upon the ornamental in the rest of the apartments, especially as the vileness of the floor becomes more offensively conspicuous, in proportion to the richness of the walls and ceilings. Here and there we meet with a splendid marble pavement in some gallery or saloon, or perhaps an entire suite of elegant and consistently furnished apartments; yet such exceptions do not interfere with the general character of these Roman palaces, which for the most part have rather the air of public than of private buildings: just that kind of order is kept up in them as in places that acknowledge no individual owner or master who has a personal interest in them. However, when lighted up of an evening, their spacious chambers are well enough fitted for the reception of a fashionable crowd of loungers, who effectually conceal the meanness of their floors from observation; besides which, the dinginess of furniture and hangings is then less striking than in broad daylight."

"I have heard it suggested," says Simond, "that there might be something of the *grandioso*, lurking about the filth of a Roman palace. The noble owner occupies but a small part of the edifice, the rest being intended, not for private comfort, but for the display of wealth and power, to be enjoyed by an admiring multitude at all hours, and in their own way, that is, in a manner neither very refined nor very cleanly. Solidity is the general character of the architecture of these palaces: but few are rectangular, and an awkward obliquity of the walls spoils the look of most of the rooms. The Farnese Palace is, I believe, the only one standing insulated; but although deemed the finest at Rome and the most regular, it seems singularly heavy."

In former times the palaces of Rome were doubtless much more brilliant than they now are. The vicissitudes of fortune have been keenly felt by the Roman nobility; and of these noble structures, it may be now truly said, that "the poverty and dirtiness of the owner are in many instances disgustingly apparent."

"It is, however, not fair," as Dr. Burton remarks, "to condemn a Roman noble, because his palace is dirty on the ground-floor, or even on the first story. The quadrangle at the bottom generally serves for a court or stableyard, with offices round it, and the first floor is not unfrequently let to tradesmen or other occupiers. Many English families have of late been accommodated in the Roman palaces; the suites of rooms being so extensive, the owner finds one floor sufficient for his own use, and is glad to make money by letting the remainder. All this is very discordant with our notions: but if the Roman nobles are now become poor, we should recollect that at the time when their palaces were built, they must have far exceeded us in ideas of magnificence. In some of the quadrangles the whole house of a nobleman in London might be placed: nor, in point of style, can we at all compare the architecture of the two countries."

Perhaps the best authority that we can quote concerning their architecture is Mr. Woods. It is his opinion that we do not at first sight do justice to the architecture of the Roman palaces. The great size of many of them, and the abundance and bold projection of the ornaments, produce a general impression of magnificence; but if we can get space enough in front to examine the parts distinctly, we often turn away dissatisfied, from the absurdity and disproportion they exhibit. Yet, with great faults, we may find amongst them great beauties which, when habit has enabled us to support their defects, the mind learns to enjoy. Generally speaking, there is great simplicity of design, so much so that in a large number the front is not divided into parts, either as a centre and two wings, or in any other way, but presents one simple, continued line of surface. They also exhibit much richness of detail. "It is true that these details are frequently very far from correct in themselves, and in proportions not always good; but to an architect the modern palaces of Rome are invaluable as a collection of experiments on architectural beauty on a grand scale; and let me add, in a grand style; for however they may be abused as extravagant, absurd, or preposterous, they at least avoid the greatest fault a building can have, that of being mean and paltry. The Romans, even in these degenerate days, have adopted a style fit for those who had the world at their command. These palaces are rarely degraded either with columns or pilasters: they are better without them; for these never look well in a building of many stories in height."

THE VATICAN.

To the north of St. Peter's, and therefore on the right hand of the spectator, looking upon its principal front, stands an enormous mass of building, bearing the name of the Palace of the Vatican; the reader will see a portion of this pile in our view of St. Peter's in a former number*. It may be described as the state palace of the popes, though it is not their actual place of residence. For upwards of a thousand years from the time of Constantine the popes lived in the Lateran Palace; but that fell into such decay during the translation of the Holy See to Avignon, that Gregory XI., on the return in 1377, not thinking it suitable, or safe, removed to the Vatican, which had existed from an early period, and which was rendered secure by the proximity of the castle of St. Angelo. The Lateran Palace was rebuilt in 1586 by Sixtus V.; and in 1693, Innocent XII. turned it into a hospital for the poor. Paul III. (1534—1550.) was the first pope who took up his residence in the Quirinal Palace on the Monte Cavallo; and his successors have followed his example, leaving the Vatican for the celebration of ceremonies.

The exterior of the Vatican is not prepossessing; in an architectural sense the term Palace is hardly applicable to it, as, instead of presenting one regular pile, it consists of a number of different structures. Simond describes it as "presenting only a shapeless mass of buildings, almost overtopping its neighbour, St. Peter's." Another writer speaks of it as "a huge collection of old buildings, curiously jumbled together, full of sharp angles and strange excrescences, and, as somebody once observed, it is not like a palace, but a company of palaces, which seem to be jostling each other in a contest for place and precedency." Its actual dimensions exceed those of the Louvre and Tuilleries united. There are twenty courts with porticoes, eight grand, and two hundred small staircases.

"The dimensions of this palace," says Dr. Burton, "and the number of rooms assigned to it, border upon the marvellous. The whole pile of building, together with gardens, is said to comprise a circumference of some miles; and while some accounts make the number of apartments 4,422, others swell it to 13,000! The effect of all this mass of architecture is anything but pleasing; from no point of view does it present any extent of front or magnificence of design; while its proximity to St. Peter's interferes most unfortunately with the view of that building. It is in fact a collection of apartments built by several popes. The date of its first commencement is not clearly known. There was certainly a palace here in the time of St. Leo III. as Charlemagne resided in it A. D. 800 Celestine III. added to it in 1191—8, as did Innocent III 1198—1216; and Nicholas III. in 1278. Nicholas V. in 1447—55, built the rooms which were afterwards painted by Raphael. Leo X. added the triple portico, the middle one of which is also painted by Raphael, and is thence called *Le Loggie di Raffaello*. Sextus V. added an entirely new palace, and Pius VI. built what is called the *Museo Pio-Clementino*. The paintings and statues preserved in this building, together with its prodigious library, have deservedly raised the fame of the Vatican above that of every other palace in the world. The pictures are not numerous; but those which are here are all excellent, and the paintings in fresco are some of the most wonderful productions which exist."

The principal staircase of the Vatican is that which leads into it from the vestibule of St. Peter's by the side of the equestrian statue of Constantine the Great. It opens into a hall which serves as a vestibule to two magnificent chapels, the Sistine and Pauline. This *Sala Regia*, or Royal Hall, as it is called, was built by Antonio San Gallo, and is adorned with fresco paintings by Vasari and others. Of these pictures Dr. Burton observes, that to a zealous Catholic they may be interesting, but will excite a smile in a Protestant, who prefers authentic history to the traditions of the church. They almost all relate to circumstances which tended to exalt the holy see; and among them is the massacre of St. Bartholomew which "might as well have been omitted." It was painted by Vasari during the pontificate of Gregory the Thirteenth (1572—1585), who also had a medal struck to commemorate the slaughter of the Hugenots.

THE SISTINE CHAPEL.

This chapel derives its name from Pope Sixtus the Fourth, who employed Baccio Pintelli to build it, and had the two side walls painted by several Florentine artists about 1474. It is an oblong room very large and lofty, with scarcely any of the usual furniture of a chapel; it is used only on few occasions, as on the First Sunday in Advent, and in the Holy Week. It is in this apartment that the cardinals meet in conclave to elect a new pope.

The principal attraction of the Sistine Chapel lies in the frescoes painted in it by Michel Angelo. Soon after his return from Bologna to Rome, in 1508, that great artist received orders from Pope Julius the Second to paint the vaulted ceiling of this apartment. Up to this period Michel Angelo had been very little employed in painting, having acquired his great celebrity as a sculptor. He had, however, astonished his countrymen at Florence, some years before, by his wonderful cartoon of the Battle of the Arno, painted for one end of the hall in the Ducal Palace, the other end of which had been assigned to the pencil of Leonardo da Vinci. We are told that Julius was advised to employ Michel Angelo to paint the chapel by Bramante and San Gallo, the eminent architects; and it is said that Bramante was instigated by unworthy motives in giving this counsel; imagining either that the large sums which the pope was expending in sculpture would leave less at his command for architectural purposes, or that Michel Angelo, who preferred the practice of sculpture to that of painting, would refuse to perform the task in question, and so enrage his patron,—or that should he attempt it, he would manifest his inferiority as a painter to the great Raphael, who was Bramante's nephew, and whom therefore Bramante wished to bring into favour with the pope. Michel Angelo was at the time absorbed in the great work which he had undertaken of executing a monument for Julius the Second; he wished to decline the task, and is even said to have recommended Raphael as a person better qualified to perform it. But the pope was inexorable, and Michel Angelo reluctantly undertook the work. So anxious was he for the success of the work, that he prepared the colours with his own hands, and finished the whole with scarcely any assistance. Even the scaffolding is said to have been made under his own directions, and he gave the profits of it afterwards to a poor carpenter, who had executed it for him. The agreement, which he made with the pope, through Bramante, was for 15,000 ducats. He constantly refused to admit any person into the chapel while the work was going on: but in 1511, when about half of it was finished, the pope insisted upon its being thrown open to public inspection, this was accordingly done. The great artist was then urged, more than ever by the pope, to hasten its completion, and on November 1st, 1512, the whole work was concluded, and the public admitted without reserve. The whole time during which he was employed in it, did not exceed twenty months. Besides the twelve compartments of the roof, he painted a portion of the side walls.

"He selected subjects from the Old Testament for the ceiling," says Dr. Burton; "among which may be observed several circumstances attending the creation, treated in a most sublime manner, and with an effect truly astonishing. To artists it may be interesting to know, that the Deluge was the first subject executed by him. He also painted some Prophets and Sibyls over the windows, which are amongst the finest works which he has left. The Sibyls are five in number, and are known by the name of the Persian, Erythræan, Delphian, Cumæan, and Libyan. The introduction of such figures at all into a Christian Church may seem extraordinary." The cause of it is found by the learned writer in the attempt which was made in the early ages of the church to enlist the Sibylline books† of the ancient Romans in the cause of Christianity, and even to invent others and class them under the same denomination. "A treatise has been written upon the subject by David Blondel, in which he conjectures, that the forgery began about the year 138; and he even accuses Hermas of being accessory to it; but the charge is certainly unfounded. The Gnostics pretended to have some genuine works of Noah's wife; to meet which formidable document, the orthodox party produced the writings of Noah's daughter, whom they called a Sibyl. As many as eight books were circulated under the name of Sibylline; and nearly twenty persons from different countries are mentioned as Sibyls. Of these, the five already named, became the most celebrated, and some of the early fathers, pious and learned men, believed that they really had prophesied of our Saviour. It will be sufficient to mention Justin Martyr

* See *Saturday Magazine*, Vol. XII., p. 101

† See *Saturday Magazine* Vol. X. p. 204.

and Clemens Alexandrinus. The Roman Catholics have particularly appealed to them in support of some of the doctrines which are now rejected by the Protestants: and this will sufficiently account for their being joined in company with the Prophets in the Sistine Chapel."

But the paintings in the compartments of the ceiling are not the only examples of Michel Angelo's genius in the Sistine Chapel. Above the altar is his celebrated Last Judgment. This great picture had been projected in the lifetime of Clement the Seventh; his successor Paul the Third, attended by ten cardinals, went to visit Michel Angelo, and seeing the cartoons which had been prepared for it, determined that nothing should prevent its speedy execution. For eight years the great master was employed upon it, and it was opened to the public in Christmas, 1542. Dr. Burton speaks of this work as "perhaps the most wonderful specimen of the art in the world. I mean," he adds, "the most surprising monument of genius and imagination: for unless we confound the ideas of the beautiful and the sublime, and conceive that the former is always contained in the latter, it must be acknowledged, that many other paintings are more pleasing at the first view. But notwithstanding the ridiculous way in which some part of the subject is treated, and the mixture of sacred and profane history throughout, this work of Michel Angelo will surprise and please more and more every time that it is examined. It will perhaps be more admired when considered in single groups, than as a whole. It has often been remarked, that Michel Angelo was indebted for the conception of some of his figures to the poem of Dante."

The same writer mentions an amusing story told concerning a figure in this picture, which was intended as a portrait of a certain master of the ceremonies, who had complained to the pope of the indecency of the painting. His name was Biagio of Cesena: the painting was not quite finished when he made this complaint, and Michel Angelo introduced his portrait as a demon with ass's ears, encircled with a large serpent, and placed him in hell. Bragio again complained, and the pope requested the painter to release him. Michel Angelo replied, that had he been only in purgatory, it might have been possible, but from hell there was no redemption.

"After all, we see this sublime work in the most disadvantageous manner. It is now more than two centuries and a half since it was completed, and the action of damp, united with the smoke from the incense and the candles, has thrown a great obscurity over the whole. In the present age we may, perhaps, be allowed to regret, that the great masters painted so much in fresco. M. Angelo was accustomed to say, that painting in oils was an occupation for women, so convinced was he of the greater difficulty and merit of executing works in fresco. He confirmed this observation by his practice; and though he unquestionably amused himself occasionally with oils, it is asserted, upon the best authority, that there is not one undisputed oil-painting of his in existence. Many are exhibited as laying claim to this honour, which, perhaps, were executed by his pupils, and may have received some touches from the master himself. Whatever may be the comparative merits of the two arts, we have evidently suffered by fresco painting being preferred; for while we have pictures in oil by Leonardo da Vinci, Raphael, and others, contemporary with M. Angelo, the colours of which seem as fresh as when they were first laid on, (and perhaps more pleasing in the effect,) those which were painted upon the wall, have in a great part perished, and the rest are daily becoming more indistinct; so that unless this new discovery of detaching frescos from the wall can preserve such works, our descendants will be enabled to judge of these great efforts only by copies and engravings. It might be thought that the ancients mixed their colours for painting upon plaster better than the moderns, at least, that they were more durable. Pliny mentions some paintings still existing at Ardea, Cære, and Lanuvium, which were older than the foundation of Rome, and had received little or no injury, though in a ruined building, and exposed to the air. This would give them an antiquity of eight hundred years and upwards."

THE LOGGIE AND CAMERE OF RAPHAEL.

The *Loggie* of Raphael in the Vatican are, as the name implies, three *open galleries*, running round three sides of a square court. They were built by Pope Julius the Second, having been begun by Bramante, and finished from the designs of Raphael. In the middle gallery, the ceiling is painted entirely after designs of that great master, who employed in the work Giulio Romano, Polidoro, Caravaggio, and other of his pupils. The ceiling is divided into thirteen compartments, each of which contains four paintings. "In the first compartment," says Dr. Burton, "which contains the Creation, God dividing Light from Darkness, is by him, and much admired. But surely this is a subject too sublime for the greatest human genius. Raphael probably chose it because Michel Angelo had represented the same subject on the roof of the Sistine Chapel. The two last paintings in this series, the Baptism of Jesus and the Last Supper, are also by Raphael."

The walls are covered with Arabesques, which are also after the designs of Raphael; and he is said to have borrowed them from the Baths of Titus, which were excavated in his days. The story which is added, however, of his covering up the excavations as soon as he had finished his copies, in order that the imitation might be concealed, is one which "few would believe," as Dr. Burton remarks, "except on the most undeniable evidence." The baths were undoubtedly open in his time, as the Laocoon was discovered in 1506, and he painted the Loggie in the Vatican in 1513-21. "It is also true, that they were subsequently filled up, and the soil which occupied them was not an accumulation merely effected by time. Many of the rooms were filled up to the very top, a height, perhaps, of thirty feet; and the rubbish which has been dug out consists of stones and other ruins of buildings. The room in which the Laocoon was found, and which must have been cleared at that time, is stated by the guides to have been also choked up when the French began to dig. But we may ask, if the room was full of soil from the days of Raphael to the time of the late excavations, how was the tradition preserved, that this was the actual apartment where the Laocoon was found? It is a singular circumstance, that in almost all the rooms a round hole has been broken in the ceiling, as if purposely to throw in rubbish. So that it is, perhaps, not an improbable conjecture, that the owners of the land wishing to clear it for cultivation, got rid of sundry fragments which projected above the surface, by throwing them into this convenient receptacle. At all events, we must not believe the charge against Raphael without some satisfactory evidence. He is known to have been an eager searcher after antiquities, and to have made a proposal to Leo the Tenth for instituting a general examination. The Romans in his time, were perhaps, as enthusiastic in this pursuit, as they have been during any subsequent period; and we may imagine that when such a discovery was made, as that of the chambers in the Palace of Titus, thousands would be led by curiosity to examine them. Such, indeed, is the express testimony of Gianbattista Armeni, a writer of that day, who says that all Rome ran in crowds to see the ornaments of stucco and painting, which presented such singular varieties. All these persons would have seen the arabesques; they must have formed the principal objects of the Ciceroni to point out. Owing to their great height, Raphael could not have copied them without scaffolding and without lights; so that it seems impossible that he could have conceived the idea of transferring these designs to the Vatican, and keeping the originals unknown. Beside which it is certain, from the work of Giulio Mancini upon painting, that the baths were open in the time of Urban the Eighth, who reigned in 1623-44, as well as in the time of Flaminius Vacca, who wrote in 1594."

The *Camere* of Raphael are a series of four rooms, exhibiting some of the most remarkable of that great master's productions. These are all in fresco, and, as usual, have suffered considerably from time. "The rage for fresco painting," says Mr. Woods, "or rather for admiring it, and regret that it is disused, seems to start up from time to time, even in our northern climates. It is, therefore, necessary to repeat again and again, that even in Italy fresco painting rapidly decays, and that in a climate such as ours, the value of its finest productions, if painted on the walls of a room, could hardly, by any care, be made to last a century."

The decoration of the *Camere* was commenced by Pope Julius the Second, who employed as painters Pietro della Francesca, Bramantino da Milano, Luca de Cortona, Pietro della Gatta, and Pietro Perugino. The latter was Raphael's master, and by his recommendation, as well as that of Bramante, Raphael was called from Florence to Rome in the year 1508, when he was twenty-five years of age. He was first employed in the *Camera della Seg-*

natura, and finished what is generally called the Dispute upon the Sacrament. The pope was so astonished and delighted with this effort, that he ordered all which had been done by the other artists to be destroyed, that all the rooms might be painted by Raphael. It is said that he received for each large painting 1200 crowns of gold. He, however, spared the work of his master, Perugino, which is still to be seen upon the ceiling of one of the rooms.

The first of the *Camere* was painted about 1517, and is filled with subjects taken from the lives of those popes who bore the same name with the reigning pontiff. The principal painting is the Fire of Borgo San Pietro, which took place under the pontificate of St. Leo the Fourth, in the year 817. Borgo San Pietro is that suburb of Rome which lies near St. Peter's. The fire came near the Vatican, and, according to the legend, Leo extinguished it miraculously with the sign of the cross. The front of old St. Peter's is introduced with steps leading up to it, and the balcony for the papal benediction. "This painting is by many admired as much as any of the series. For delineation of feeling and anatomical accuracy it certainly merits every attention. The latter excellence may be seen particularly in two figures, one of whom is clinging by his hands to a wall, from which he is letting himself down, the other is drawing himself up; in both of which opposite exertions of the muscles great accuracy of drawing is observed. The group of the man carrying off his father is by Giulio Romano."

Opposite to this is the Justification of St. Leo the Third before Charlemagne, in which the Pope is a portrait of Leo the Tenth, and Charlemagne of Francis the First, king of France. On one of the other sides is the Victory gained by Leo the Fourth over the Saracens at Ostia, painted by Giovanni da Udine; opposite to which is the Coronation of Charlemagne by St. Leo the Third in the old cathedral. The ceiling is painted by Perugino.

Other parts of the room contain paintings of those princes who have been benefactors to the Holy See. Over one of them is written,—"Astulphus Rex sub Leone IV. Pont. Britanniam Beato Petro vectigalem facit*." St. Leo the Fourth reigned from 847 to 855, during which time Ethelwolf was king of England. It is recorded that he made a journey to Rome, and gave 300 *mancuses* a year to the See of Rome; one-third of this was to support the lamps of St. Peter's, another third those of St. Paul's, and the remaining third was to go to the Pope himself. Some writers say, that it was Ethelwolf who agreed at this visit to pay the tribute to the See of Rome, which was called Peter's Pence, and which was continued till the time of Henry the Eighth.

These figures are said to have suffered when Rome was pillaged in 1527. Carlo Maratta was employed by Clement the Eleventh to restore them, as well as to clean all the rest. Some of the heads were restored by Sebastian del Piombo; and an anecdote is told of Titian, who, going to view these paintings in company with Sebastian himself, asked him who that presumptuous and ignorant person could be, who had daubed over those faces?

The second room derives its name from the celebrated painting of the School of Athens, as it is commonly called, or Philosophy, as some style it; in this work Raphael has introduced portraits of some of the most noble and distinguished persons who lived in his own age, or shortly before it. This painting has suffered in common with the others; but it is still sufficiently perfect to command universal admiration. Archimedes, who is tracing with compasses on a tablet, is Bramante; the young man near to him, with his left knee upon the ground, who is looking back, and showing the figure to his companion, is Frederic the Second, Duke of Mantua. The two figures to the left of Zoroaster, who may be known by the globe in his hand, are Raphael, himself, and his master Perugino. A youth in a white mantle, with his hand in his breast, by the side of Pythagoras, is Francesco Maria della Rovere, Duke of Urbino, and great nephew to Julius the Second. The original cartoon of this painting is in the Ambrosian Library at Milan.

Poetry is represented by Mount Parnassus, on which are Apollo, the Muses, and various poets. Behind Homer is a portrait of Dante in profile: he is following Virgil, dressed in a red mantle, with a cap crowned with laurel; near to Virgil is supposed to be Raphael himself. Beneath these, and in the front, is Sappho, holding in her left hand a volume inscribed with her name. She is turning towards a group of four figures, of which the woman with flowing hair, in conversation with a man and pointing to Homer, is intended for Corinna; and it is supposed the two figures are intended for Petrarch and Laura. The figure in front dressed in yellow, whose face is not shown, is Ovid. On the left, corresponding with Sappho, is Pindar; in front of him is Horace. Another with his finger on his mouth, is probably Callimachus. Behind them is Sanazzaro, without a beard. Two figures crowned with laurel are Tebaldeo and Boccaccio: the latter has no beard, and his hands are hidden in his dress. To represent Jurisprudence, Justinian is drawn giving the Digests to Tribonian, and Gregory the Ninth presenting the Decretals to a consistory. The Decretals were published in 1234, at the command of that pope, and may be considered as the foundation of that code of canon law which the church of Rome has acted upon ever since. They form a collection of the decrees of councils, and the rescripts, or decretal epistles, of popes to questions propounded upon emergent doubts relative to matters of discipline and ecclesiastical ceremony. The pope in this picture is a portrait of Julius the Second; and near to him are figures portraying the cardinals, who became afterwards Leo the Tenth and Paul the Third.

Opposite to the School of Athens in the second room, is the painting generally termed the Dispute upon the Sacrament. "This title," says Dr. Burton, "is probably erroneous; and as there are on the ceiling figures of Theology, Philosophy, Poetry, and Jurisprudence, and the paintings under each correspond to these figures, it would seem more appropriate to call this, which was his first performance, Theology. The four doctors of the Latin church, Gregory, Jerome, Ambrose, and Augustin, are introduced in it, together with other divines, an altar with the eucharist, and in the heavens the Trinity and various saints. This bears marks of Raphael's early style, and will not please so much as the others. Our Saviour and the saints have glories round their heads, laid on in gold. Critics have discovered, that he began on the right-hand side of the wall; and they observe a manifest improvement in the style during the progress of the painting. It is also interesting from some portraits, which he has introduced in a group of three figures; that which is leaning on a marble parapet, with his right-hand upon an open book, is Bramante. At the right-hand corner are two figures, and several heads behind them: one of these heads represents Dante in profile with a wreath of laurel, and near him St. Thomas Aquinas, and Scotus."

The third chamber derives its name from a painting of the story of Heliodorus, taken from the third chapter of the second book of Maccabees. According to some, this was partly executed by Giulio Romano; but by all it is allowed that the design is throughout that of Raphael. A portrait of Julius the Second is introduced into it. On the opposite wall is a picture representing St. Leo the First going out to meet Attila, the invader of Italy, as he lay encamped near the Mincio; upon which occasion, according to the legend, St. Peter and St. Paul appeared and threatened the barbarian with instant death, if he did not listen to the prayer of the pope. On the other sides of this room are the Liberation of St. Peter from Prison, and an absurd popish miracle.

The fourth room, called the Hall of Constantine, was not painted by Raphael. He had finished the design of the victory of Constantine over Maxentius, and commenced painting it upon the wall in oils when he died. His pupil, Giulio Romano, completed the work in fresco, destroying all that his master had done, except two figures of Justice and Benignity which were quite finished. On the opposite wall is a painting of the Apparition of the Cross to Constantine, previous to his last battle with his rival Maxentius; it is said to be likewise the work of Giulio Romano.

In rooms adjoining the Camere are tapestries copied from Raphael's cartoons. These cartoons were executed for Leo the Tenth, who sent them to Arras in Flanders to be copied in tapestry, in two sets, one of which was intended to decorate the pontifical apartments in the Vatican, and the other as a present from the pope to our King Henry the Eighth. The cost of executing these tapestries was between sixty thousand and seventy thousand crowns of gold. The set retained in Rome was carried off when Rome was plundered by the imperial army in 1527; but restored to the pope by the French general, Montmorenci.

* "King Astulphus, under Pope Leo the Fourth, made Britain tributary to the Blessed Peter."

They were again taken away in 1798, when the French Republican army entered Rome: and some time afterwards were found in the possession of a Jew at Paris, who had burnt two of them for the sake of the gold and silver which they contained. The remainder were purchased by Pius the Seventh and restored to the Vatican. The set presented to Henry the Eighth remained in England till the Great Rebellion, being hung up in the banqueting-room at Whitehall. After the death of Charles the First, these tapestries were sold with the rest of the royal collection, and purchased by the Spanish ambassador, who sent them to Spain. They have since passed through various hands.

The original cartoons, twenty-five in number, were left neglected at Brussels, and most of them seem to have been lost or destroyed. A few, however, escaped, and seven are now in England in the royal collection at Hampton Court. They were bought in Flanders by Rubens for King Charles the First. At the dispersion and sale of the royal collection, the cartoons were secured to the country by purchase, by Cromwell's particular command. At this time, it appears that the triumphs of Julius Cæsar by Andrea Mantegna (still preserved at Hampton Court,) were valued at 2000*l*., while the cartoons of Raphael were estimated at only 300*l*. In the reign of Charles the Second they were again consigned to neglect. They had been sent to Mortlake to be copied in tapestry, where they were seriously injured. William the Third had them repaired, and built a gallery at Hampton Court for their reception. George the Third removed them to Buckingham Palace, and subsequently to Windsor Castle. At a later period they were brought back to Hampton Court, where they still remain one of the choicest of the treasures of art which our country possesses. "One cartoon," observes Mr. Woods, "is worth all the tapestries."

Besides the paintings in the *Loggie* and *Camere*, the Vatican contains many others of the highest class. Some of these were first placed in it when Napoleon's spoils were brought back from the Louvre. Among them is the celebrated Transfiguration by Raphael, commonly called the finest picture in the world; it formerly stood in the church of S. Pietro in Montorio, which, on that account, used to be regularly visited by all strangers, and which now receives a pension by way of compensation for the loss. The same apartment contains also the picture which, in the opinion of some, disputes the prize with the Transfiguration, namely, the Communion of St. Jerome by Domenichino. In other apartments are to be seen Raphael's Assumption of the Virgin, Guido's Martyrdom of St. Peter, Caravaggio's Taking down from the Cross, and Leonardo da Vinci's Christ and his Apostles,—all master-pieces of art.

STREETS OF MODERN ROME.

"The streets of modern Rome," says the author of *Rome in the Nineteenth Century*, "are narrow, gloomy, and indescribably dirty. Indeed, of all its antiquities, I imagine the dirt to be the most indisputable, for I am inclined to think that it never was cleaned away since it was a city. There are no trottoirs for foot passengers, so that they have the pleasure of walking through the mire as at Paris, with the agreeable anticipation of being run over every minute. But at Rome no people of condition walk; a noble Italian would not be seen on his or her legs for all the world; and as for the canaille, 'gli popoli,' it signifies not what becomes of them anywhere except in England. I remember a Neapolitan marchese assuring me, that if you drove over a child at Naples, you would have to pay a small sum of money,—if a man, a larger one,—if an old woman, nothing at all.

"The system of narrow streets, which is defended on the ground of being adapted to the climate, tends on the contrary, in my opinion, to increase evils. They are cold in Winter, and hot in Summer; for when the sun is low in the sky, the height of the houses is an effectual screen from his beams, but when it mounts into the zenith, his meridian blaze pours down into the streets, and the heated walls on either side give out their alternate caloric, even through the night, so that the close, confined air, has the feeling of an oven: and the gasping inhabitants are half baked,—at least I know I was."

The *Corso* is the principal street of modern Rome. It runs from the *Porto del Popolo*, or ancient Flaminian Gate, to almost the foot of the Capitol; it is a mile in length, and perfectly straight. It seems to occupy the same line as the ancient *Via Flaminia*; its present name is derived from the horse race, of which it is annually the scene during the carnival; "a race that was formerly run by unfortunate Jews, in company with asses and buffaloes." During this season of festivity the whole street presents a very gay appearance; "scraps of red damask trimmed with gold, but rather the worse for wear, and other pieces of tapestry," are hung out from every window. In ordinary times, this street is the fashionable drive of the city, in which ladies and gentlemen "are daily seen, about three o'clock, in shabby equipages, which they think very fine, slowly driving up and down, for the benefit of the air, in a hot and close street, looking very tired, and yet not knowing what better to do with themselves."

But if the Corso be "the Bond Street of Rome," as Mr. Mathews says, "it is also the Billingsgate. There are two fish stalls under my window, the people belonging to which commence their vociferations as soon as it is light. There is, however, at least more variety in their cries, than in the perpetual 'All alive ho!' of London. The Italian fishmonger displays all the humour he is master of to get rid of his stock, and he will sometimes apostrophize his stale mullet with ludicrous effrontery;—*Pesce! cosa fatte? Pesce! state chete**! But the worst objection to our lodgings is their height. We are on the *quattro piano*,—a hundred and four steps from the ground; though this objection relates only to convenience, for it is by no means *mauvais ton* in Rome to live in the upper story, which does not at all answer to our garret. Here your approach to heaven does not at all detract from your gentility."

FOUNTAINS.

"The Fountains of Rome," says Forsyth, "show a great variety of composition, without borrowing so incessantly as ours do, the furniture of ancient fountains. Some of them are beautiful: one or two grand. On an object so simple as the emission of water, the danger of doing wrong will be ever in proportion to the quantity of embellishment. On this principle the magnificent vases before St. Peter's and the Farnese Palace, are much safer from criticism than Bernini's creation in the *Piazza Navona*, which affects puzzling conceits, and looks like a fable of Æsop done into stone The sculpture of *Trevi* is another pompous hodge-podge of fable and fact, gods and ediles, aqueducts and sea monsters; but the rock-work is grand, proportioned to the stream of water, and a fit basement for such architecture as would suit a *castel d'aqua*, not for the frittered Corinthian which we find there. The *Aqua Paola* derives all its effect from the volume of water; for its elevation is poor, and the pediment a mere gable filled with armorial nonsense. Had the three streams been collected into one sheet, and that sheet committed, with the glorious site, to the genius of M. Angelo, what a number of faults would there be for the critics; but how sublime the result!"

Mr. Mathews characterizes the fountains of Rome as "among its most striking ornaments," on account not only of the architectural designs which embelish them, but also of the prodigality of water which they pour out in all parts of the town. "The effect of this in summer must be delightfully refreshing, from the sensations of coolness which running water always communicates."

To the Fountain of Trevi is generally assigned the first place; in the words of the writer last quoted, it is, "perhaps, the most magnificent." It derives its supply of water from the ancient aqueduct called the *Aqua Virgo*, which was brought to Rome by Agrippa. It was originally constructed by Pope Nicholas the Fifth, (1447—1455.) and obtained its name of Trevi from the three jets by which the water was poured out. Clement the Twelfth, (1730—1740,) entirely altered its form, and gave it, to use the expression of Vasi, "that character of nobleness and magnificence which shines in the other edifices of Rome." He decorated it with statues and bas-reliefs of stucco, which Clement the Thirteenth, (1758—1769,) replaced by the more durable material, marble. The fountain is immediately in front of the Buoncompagni Palace, to which many of its ornaments are attached. The water issues from a mass of rocks, and is received in a large marble basin. In the centre is a colossal statue of the Ocean, in an appropriate car drawn by two horses, each of which is led by a Triton. On either side, in lateral niches of the palace, are statues of Health and Plenty, above which are bas-reliefs

* "Fish! what are you doing? Fish! keep quiet!" Compared with this, "All alive ho!" is decidedly coarse and blunt.

representing Marcus Agrippa, who first brought the water to Rome, and the young virgin who pointed out its source to some soldiers, and from whom its ancient name of Aqua Virgo was derived.

Mr. Woods, speaking of this fountain, says, "Plenty of fault may be found both with the architecture and with the sculpture; yet on the whole it is very magnificent, and with its profusion of bright water, makes a most noble object, such as is seen in Rome, and in Rome alone. The rocks and jets of water below are admirably disposed, and if the banks are sometimes dirty we must not fix our attention on them."

Of the other fountains in Rome, the most remarkable are those in front of St. Peter's, which were executed from the designs of Carlo Maderno. The fountain of the *Aqua Felice*, or as it is also called, of *Moses*, from the colossal statue which forms its principal ornament, and of *Termini*, from the name of the place on which it stands; the Great Fountain of Bernini in the *Piazza Navona*; and the Pauline Fountain near the church of San Pietro in Montorio, on the hill anciently called Janiculum. This last is the largest fountain in Rome, and exhibits, in fact, a vast pile of architecture, the water issuing from the five niches formed by six Ionic columns of red granite.

THE PIAZZE, OR SQUARES OF ROME.

Modern Rome contains a very large number of the open spaces called *Piazze;* the effect of them is very pleasing, more especially as the streets are so very crooked and close. The buildings which surround them frequently comprise fine churches and palaces; and their area itself is generally adorned with fountains, and occasionally with ancient Egyptian obelisks. We have already incidentally described several of the Piazze, and we shall confine our present remarks to the most important of the remainder.

The *Piazza di Spagna* is one of the finest in Rome; it derives its name from the palace belonging to the court of Spain, which is among the edifices which surround it. It is not very far from the Piazza del Popolo, and on account of this proximity to the principal entrance of Modern Rome, as well as the number of hotels which it contains, it is the chief resort of foreigners in Rome. "From this piazza," says Mr. Woods, "a most magnificent flight of one hundred and twenty-two steps leads you to the church of *Trinita de Monti*. I had heard of the steps up to the Capitol, but never of these, which, by-the-by, are much more showy, and I did not doubt on my arrival that I was at the foot of the ancient Capitol. All these steps I have to ascend to my lodging, and about sixty more within the house; but to reward my labours, when I am at home, I command a fine prospect over the greatest part of Rome, and, perhaps, the very best distant one of the Vatican."

The *Piazza Navona* is remarkable, as indicating the site of the ancient *Circus Agonalis*, of which it still retains the form. It is about seven hundred and fifty feet in length; and in the centre of it stands an Egyptian obelisk, fifty-four feet high, and resting upon a rock, itself forty feet high. It was removed thither in 1649, from the circus outside of Rome, which bears the name of Caracalla; it was then lying on the ground, broken into five pieces. Bernini placed it in its present position, and at its base he erected a fountain, which is one of the oddest of the many odd creations of his genius to be seen in Rome. There are two other fountains of a more unpretending and intelligible description, in this piazza, one on each side of the great monster, in the middle and at some little distance from it. Dr. Burton says, that on some occasions chariot-races are still performed in this place after the ancient fashion; "and on Saturdays and Sundays in the month of August, it is covered with water to provide a remedy against the intense heat." The equestrians of Rome take great delight in refreshing themselves and their panting cattle, by splashing about in this pool.

Close to this piazza is a small space in which stands the famous statue of *Pasquino*. It took that name, according to Vasi, from a tailor, who was possessed of a satirical vein, and used to amuse himself with discharging his wit at persons passing by his shop. "After his death, this statue was found near there, and at once acquired the tailor's name; and from that time the satirical began to affix to it their defamatory writings, which have, even in France, obtained the name of *Pasquinades*." Dr. Burton says, that "it was found in the sixteenth century and placed over against the shop of one Pasquino, a tailor, where all persons used to meet who wished to abuse their neighbours." It is a sadly mutilated piece of marble; but the *virtuosi* admire it, and have called it Menelaus supporting the body of Patroclus.

Whatever may be the real name of this statue, it has acquired, under its fictitious appellation, a remarkable degree of celebrity, from being chosen, by the wits and satirists of Rome, as the depository of their effusions. There was formerly another statue called *Marforio* which enjoyed a similar celebrity. It used to be selected as the answerer of the satirical sayings which emanated from Pasquino; and between the two, an entertaining dialogue was occasionally kept up, seldom very complimentary to the parties of whom it treated, and not always sparing the pope himself. Pasquino, however, now reigns alone; Marforio was silenced many years ago by one of the popes, who shut him up in the Courtyard of the Capitoline Museum. The same pope is said to have very much wished to shut up Pasquino too; but the marquis to whom he belonged interposed, and his descendants, as we are told, are at this day obliged to pay a fine if any scandal be found affixed to it. Pope Adrian the Sixth is said to have meditated a much more severe attack upon the statue. "He was so offended at its libels," says Dr. Burton, "that he ordered it to be burnt, and the ashes to be thrown into the Tiber: but Ludovico Suessano, a witty companion of the pope, had the merit of saving poor Pasquino, by telling his Holiness that the ashes would turn to frogs in the bottom of the river, and croak worse and louder than before."

Mr. Mathews, in his *Diary of an Invalid*, mentions a keen effusion of Pasquino's wit which made its appearance during the pontificate of Pius the Sixth (between 1775 and 1800), who was possessed with a remarkable passion for recording his own glory in the constant inscription *Munificentia Pii Sexti*,—"By the munificence of Pius the Sixth." A season of great scarcity existed in Rome, and the *pagnotta*, or little roll, which is always sold for two *baiocchi*, (about three half-pence,) however much its size may be effected by the price of corn, had shrunk to a most lamentable littleness. One morning one of these Lilliputian loaves was found in the hand of Pasquino, with an appended scroll in large characters, Munificentia Pii Sexti.

THE MODERN ROMANS.

O Rome within thy tomb a spirit lurks
That animates afresh their crumbled clay:
'Tis in thy palaces destruction works,
For living man rots there in foul decay:
A ruin that hath made itself, and where
The past is a reproach, the future is despair.

There scarcely exists a people, whose character has been the subject of more severe censure, than has been heaped upon that of the modern Romans. It cannot be denied that they are often judged with great severity; in the mind of every traveller a comparison is insensibly excited between the modern Romans whom he sees, and the ancient Romans of whom he has read, and of course such a comparison cannot fail to be to the disadvantage of the former. "The national character," says Forsyth, "is the most ruined thing in Rome. The character of the common people is usually locked up, yet, subject to strange escapes. They can make long sacrifices to a distant pleasure. Thousands starve during the whole month of September, to provide for one extravagant feast in October, at Monte Testaccio. Though timidly cautious in common transactions they are desperate at play. This passion, pervading every rank, finds all the lotteries of Italy open at Rome. Many call religion in to the aid of gambling. They resort to San Giovanni Decollato, a church devoted to condemned criminals, and try to catch in prayer, certain divine intimations of the lucky ticket. Their resentments can lie brooding for years before they start out. In their quarrels, I never saw any approach to fair fighting. Boys fly to stones, and men to the clasp knife: but the most desperate ruffian abstains from fire-arms. To shoot your enemy is held atrocious: to plunge a stiletto into his back a proof of spirit."

Mr. Galiffe mentions an admirable comparison by which Mr. Edward Bankes once described the modern Romans. They put him in mind, he said, of impressions of engravings from worn-out plates. "This is exactly true," adds Mr. Galiffe; "they seem, to be but half-finished; and in most parts so faintly portrayed that you cannot conceive why nature perseveres in striking off more copies of them. Wherever the strokes are deep and strong, you may be sure there is a blot. The Romans are a sullen, pale, spiritless, morose people. They hardly ever speak except to beg

alms, which when offered they absolutely tear from the giver, without taking the trouble to thank him for them, and without showing the least satisfaction at having obtained them. They are not at all like the Italians we had previously seen; in fact, they are like no other living beings. The whole nation seems tired of its existence, and waiting for the sleep of death. Walking, seeing, hearing, every act in short, seems to be a painful exertion of exhausted mind and body. I never saw one of them smile. I am now speaking of the native Romans of the lower classes, not of the temporary inhabitants of Rome, who come from various districts far and near, to gain their livelihood in the city; nor am I speaking of the country people in the neighbourhood. The latter, whose appearance is classical, graceful, and picturesque, do seem to have some life and spirit remaining. How different, alas! from the melancholy citizens of Rome! Yet is there something in the sulky insolence of the Romans,—in their morose, ill-natured looks—that puts one strongly in mind of what they were in the days of their prosperity. Their manner is like the growling of an old mastiff, conscious at once of his former strength, and of the loss of his teeth. It is this galling sense of their impotence which makes them such dangerous enemies; they brood over their injuries with a degree of malice of which they would not be capable, if they thought they could easily revenge themselves, and as they are possessed of few ideas, that one passion which happens to take full possession of their minds festers sooner or later into a crime."

Perhaps the fittest denunciation is contained in the eloquent passage which follows; it is satire undoubtedly, but, as Mr. Conder justly remarks, it is satire pointed by truth. "These people cannot prevent the sun of their fine climate from shining at its stated hours; but they make their streets impervious to its cheering light; a deep gloom meets the eye wherever towers man's abode. They cannot prohibit the rich vegetation of their fertile soil from diffusing its fragrance; but they collect a very villanous odour to subdue nature's sweets: even amid their very orange groves, loss of scent would be a gain! They cannot cancel the spring's ancient privilege of enamelling with flowers the swelling hill and dimpled valley; but they tarry in their fetid town till the magic has vanished, and autumn embrowns both the garden and the grove;—no one thinks of country rambles till the summer is gone by. They cannot stop the crystal rills while bubbling up in the mountain; but they suffer the captive stream to ooze out of the aqueduct and to infuse pestilence into the marshy plain. They cannot dive into the inmost recesses of the human brain, there to nip in its very first germs every brightest faculty; but conducting the developements of the human reason, as the Chinese do those of their peach and plum-trees, they encompass each tender shoot of the intellect with so many minute fetters, religious, political, and social, that dwarfs are produced where giants were intended. Their manuscripts are not suffered to be inspected; their pictures are left to rot. Their very city has been allowed to slip from its seven hills into the sink between. They clip their trees into men, and their men into singers. Their law deems infamous not the thief, but the magistrate. Their tribunals sell justice to the highest bidder; their churches screen the criminal. The seclusion of the convents is the school of the sovereign; the renouncement of the world, the preliminary to ruling the state; and the decrepitude of old age, the chief recommendation in the candidate for the supreme power. Vigour to hold the reins of government is a motive for exclusion from the pontifical throne. Those who aspire to govern, must renounce connubial bliss; and all chance of a lawful lineage must be foregone ere these honours are attainable which man elsewhere seeks chiefly for the sake of his offspring. Hence nephews step into the place of sons; and the very policy of the statesman becomes doubly crooked from the oblique direction given to his affections. The word virtue, indeed, exists in the language, but is applied to skill in singing; and as to valour, the former signification of the same word, it is a quality which during so many ages has been let out for hire,—first in the gross by the *Condottiere*, and next, more in detail by the professed Bravo,—that those disclaim it who value their character; and cowardice, under the name of caution, forms not only the privilege of the priest, but the pride of the cavalier. Visit a friend in the day-time, and he surveys you through a grated hole in his entrance door, ere he dares to let you in; venture out at night, and from a distance you are bidden to avert your eyes, lest one murder witnessed should necessitate a second. The very head of the Church, when in the holy of holies, dares not take the consecrated wine except through a gilded reed, lest his lips should suck in poison; and in the heart of his capital, the pontiff of Rome keeps in his pay, for the safety of his person, the rude mountaineer of Switzerland, as your Turkish pasha does the barbarian from Epirus and from Coordestan. Thank God! however, this mass of imbecility and vice hies fast to its fate. Nature herself conspires with man in the work of just destruction. In that sky, so transparent, lurks a permanent poison, which formerly only creeping like the adder along the hollow valley now soars like the eagle above the steepest hill, and invades the last abodes once safe from its intrusion. Thus shall soon the world's ancient mistress again return to nought; and as the herdsman erst wandered in solitude, where Rome in later days arose, so shall the herdsman again wander in solitude where Rome has ceased to be."

The Comte de Tournon, however, who was "prefect of the department of Rome" during the French occupation, from 1810 to 1814, is disposed to pass a more lenient sentence. After speaking of the measures which he adopted in his official capacity, for the repression of crime, he says, "By these means it was proved that the Roman people could be soon raised to a very high degree in the scale of morality, and rendered as humane, mild, and orderly, as their neighbours of Tuscany. Indeed, there is nothing in the disposition of the modern Romans opposed to the assumption; on the contrary, they are full of intelligence, having a strong feeling of self-respect; and although prone to anger under provocation, they are, in the common relations of life, gentle, benevolent, and warm-hearted, and particularly expressive of their gratitude. In the manifold relations I have had to entertain with all classes of the Roman people in the assemblies for the drawing of the conscripts, so obnoxious to a country in which war and its stern duties have been strangers for ages past, in the midst of the popular festivals, in the markets and fairs, nowhere have I seen traces of that turbulence and ferocity, which travellers have been pleased to ascribe to the modern Romans."

This writer is the author of a very valuable work published two or three years ago, under the modest title of *Etudes Statisques sur Rome*, (Statistical Studies on Rome); and his authority is, undoubtedly, possessed of great weight. Yet he, too, may have been swayed, though insensibly, by a prejudice of a very different kind from that which may actuate the mass of travellers; he was the governor of Rome, and he laboured to improve the character of the people by the system of government which he adopted—thus he may naturally have been led to estimate too highly the results of his own measures. He was undoubtedly a man of a very different class from that to which the agents of Buonaparte generally belonged; and if the system of government which he adopted did produce some of the beneficial effects which he desired, we must recollect that he only describes the Romans as they appeared under that system, whereas, others describe them as they appeared under the system which he overthrew, and which he virtually condemned, by substituting for it his own. Perhaps the position for which he contends scarcely amounts to more than this—that the Romans, under a good government, would become a better people than they are. The influence of government upon national character is undisputed; and the system under which the Romans have long lived, or rather suffered an existence, is quite sufficient to account for any debasement of character, without searching for a further cause in natural inherent vices.

The Engraving at page 73 represents a popular scene in modern Rome. The principal feature is a professional Letter-writer, who, as may naturally be supposed, is a personage of great utility and importance among the ignorant and uneducated. His occupation is announced by the inscription above his head;—"Here letters are written."

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QUEEN ELIZABETH; HER PROGRESSES AND PUBLIC PROCESSIONS. No. IX.

COPY OF AN ANCIENT PRINT, REPRESENTING A ROYAL PROGRESS THROUGH THE STRAND.

PROCESSION THROUGH THE CITY FROM THE TOWER TO WESTMINSTER (*continued*)—HER MAJESTY'S CORONATION.

AFTER leaving the Conduit in Fleet Street, where, as we related in our last paper on this subject, Elizabeth was entertained with an appropriate pageant,—the fifth and last which had been prepared to dignify her passage through the city, the queen proceeded on her way towards Temple Bar. On reaching St. Dunstan's church she found the children of Christ's Hospital standing there with their governors; and perceiving that a child offered to make an oration to her, her grace "stayed her chariot, and did caste up her eyes to heaven, as who should saye, 'I here see thys mercifull worke towarde the poore whom I muste in the middest of my royaltie nedes remembre!' and so turned her face towards the child, and listened to an oration in Latin to this effecte:—

That after the quenes hyghnes had passed through the citie, and had sene so sumptuous, rich, and notable spectacles of the citizens, which declared their most heartie receiving and joyous welcomming of her grace into the same: thys one spectacle yet rested and remained, which was the everlasting spectacle of mercy unto the poore membres of Almighty God, furthered by that famous and most noble prince King Henry the Eight, her gracious father, erected by the citie of London, and advaunced by the most godly, verteous, and gracious prince, Kyng Edwarde the Sixth, her grace's dere and loving brother, doubting nothing of the mercy of the quene's most gracious clemencie, by the which they may not onely be releved and helped, but also stayed and defended; and, therefore, incessauntly they would praie and crie unto Almighty God, for the long life and raigne of her hyghnes, with most prosperous victory against her enemies.

When the child had ended his oration, he kissed the paper on which it was written, and delivered it to her Majesty, who received it graciously both by words and countenance, "declaring her gracious mynde towarde theyr reliefe." Hence she proceeded to Temple Bar, which was "dressed finelye with the two ymages of Gotmagot the Albione, and Corineus the Briton, two giantes bigge in stature, furnished accordingly." In their hands were a copy of Latin verses, summing up the designs of the preceding pageants; and in a smaller tablet was a copy of English to the same effect, as follows:—

Behold here in one view thou may'st see all that playne,
O princesse, to this thy people the onely stay:
What eche where thou hast seen in this wide town, again
This one arche whatsoever the rest conteynd doth say.

The first arche, as true heyre unto thy father dere,
Did see thee in the throne where the graund father satte:
The seconde did confirme thy seate as princesse here,
Virtues now bearing swaye, and vyces bet down flatte.

The third, if that thou wouldst goe on as thou began,
Declared thee to be blessed on every syde;
The fourth did open trueth, and also taught thee whan
The commonweale stood well, and when it did thence slide.

The fifth, as Debora, declared thee to be sent
From Heaven, a long comfort to us thy subjectes all;
Therefore go on, O quene, on whom our hope is bent,
And take with thee this wishe of thy towne as finall.

Live long, as long raygne, adourning thy countrie
With vertues, and mayntayne thy people's hope of thee;
For thus, thus Heaven is won; thus must you pearce the skye,
This is by vertue wrought, all other must nedes dye.

On the southern side "was appointed by the citie a noyse of singing children;" and there was one child "richely attyred as a poet," who delivered a farewell address to the queen in the name of the whole city, to this effect:—

As at thyne entraunce first, O prince of high renown,
Thou wast presented with tonges and heartes for thy fayre;
So now, sith thou must nedes depart out of this town,
This citie sendeth thee firm hope and earnest prayer.

For all men hope in thee, that all vertues shall raygne,
For all men hope that thou none errour wilt support,
For all men hope that thou wilt trueth restore agayne;
And mend that is amisse, to all good mennes comfort.

And for this hope they pray, thou mayst continue long,
Our quene amongst us here, all vyce for to supplant;
And for this hope they pray, that God may make thee strong,
As by his grace puissant, so in his trueth constant.

Farewell, O worthy quene, and as our hope is sure,
That into Errour's place thou wilt now Truth restore;
So trust we that thou wilt, so Soveraigne Quene endure,
And loving lady stand from henceforth evermore.

Our chronicler relates that while this address was being delivered, and "certeine wishes therein repeted for maintenaunce of trueth and rooting out of errour," the queen now and then held up her hands to heavenward, "and willed the people to say, Amen." And when the child had finished, her grace said, "Be ye well assured I will stande your good quene." She then departed through Temple Bar towards Westminster, "with no lesse shoutyng and crying of the people, then she entred the citie with a noyse of ordinance whiche the Toure shot off at her graces entraunce first into Toure-streate."

Thus the quenes hyghnesse passed through the citie, whiche without any forreyne personne, of itselfe beawtifyed itselfe, and receyved her grace at all places, as hath been before mentioned, with most tender obedience and love, due to so gracious a quene and soveraigne ladie. And her grace likewise of her side, in all her graces passage, shewed herselfe generally an ymage of a worthye ladie and governour; but privately these especiall poyntes wer noted in her grace as sygnes of a most princelyke courage, whereby her loving subjects maye ground a sure hope for the rest of her gracious duinges hereafter.

At the end of the contemporary account from which we have derived the details of Elizabeth's reception by the city on this memorable occasion, are added "certeine notes of the Quenes Majesties great mercie, clemencie, and wisdom, used in this passage." The first of them is thus related:—

Aboute the nether ende of Cornehyll towards Cheape one of the knightes about her grace had espyed an auncient citizen whiche wepte and turned his head backe; and therewith said this gentleman, "Yonder is an alderman (for he tearmed him) whiche wepeth and turneth his face backewarde: how may it be interpreted, that he so doth for sorowe or gladnes?" The Quenes Majestie heard him and said, "I warrant you it is for gladnes." A gracious interpretation of a noble courage which would turne the doutefull to the best. And yet it was well known that as ner grace did confirme the same, the parties cheare was moved for very pure gladnes for the sight of her Majesties person, at the beholding whereof he toke such comforte, that with teares he expresssed the same.

In Cheapside the queen smiled, and being asked wherefore, she answered, "For that she had heard one say, 'remember old King Henry theyght.'" When it was mentioned to her that the city bore the whole cost of the pageants, &c., she said that it should not be forgotten—"whiche saying," continues our authority, "myght move all Englishemen heartelye to show due obedience and entiernes to their so good a quene, which will in no poynt forgeat any parcell of duetie lovingly shewed unto her." The affability of Elizabeth and her condescension towards poor persons upon this occasion, are the subject of especial notice.

What more famous thing doe we reade in auncient histories of olde tyme, then that mightye prynces have gentlye received presentes offered them by base and lowe personages? If that be to be wondered at (as it is passingly) let me se any writer that in any one prynces lyfe is able to recounte so manye presidentes of this vertue as her grace shewed in this one passage through the citie. How many nosegayes did her grace receive at poor womens handes: how ofttimes stayed she her chariot when she sawe any simple body offer to speake to her grace; a branche of rosemarye given to her grace with a supplication by a poore woman about Flete Bridge, was seen in her chariot til her grace came to Westminster, not without the marveylous wondring of such as knew the presenter, and noted the Quenes most gracious receiving and keeping the same. What hope the poore and nedy may looke for at her graces hande she can all her journey continuallye, so in her harkenyng to the poore chyldren of Christes Hospitall with eyes cast up into heaven, did fullye declare, as that neither the welthier estate could stande without consideracion had to the povertie, neither the povertie be duelye considered unles they were remembered, as commanded to us by Goddes owne mouth.

Two circumstances are noticed as especially indicating that the queen in all her doings showed herself most mindful of the goodness and mercy of God towards her. The first is her thanksgiving in the Tower before entering her chariot—an incident which is by some writers referred to her first entry within that fortress after her accession. Lifting up her eyes to heaven she said:—

O Lord, Almighty and everlasting God, I geve unto thee most hearty thankes that thou hast been so mercifull unto me as to spare me to beholde this joyfull daye. And I acknowledge that thou hast dealt as wonderfully and as mercifully with me as thou didst with thy true and faithful servant, Daniel thy prophet, whom thou deliveredst out of the denne from the crueltie of the gredy and rageing lyons: even so was I overwhelmed and only by thee delivered. To thee, therefore, onely be thankes, honour, and prayse, forever. Amen.

The other notable circumstance was her receiving of the Bible at the Little Conduit in Cheape, when she reverently took it with both her hands and

kissed it and laid it upon her breast, to the great comfort of the lookers-on.

For when her Grace had learned that the Byble in Englishe should there be offered, she thanked the citie therfore, promysed the reading thereof most diligentlye, and incontinent commanded that it should be brought. At the receit whereof how reverently did she with both her hande take it, kisse it, and lay it upon her breast, to the great comfort of the lookers-on. God will undoubtedlye preserve so worthy a prince, which at his honour so reverently taketh her beginning. For this saying is true and written in the boke of truth: "He that first seketh the kingdom of God shall over other things cast unto him."

Now, therefore, (concludes this interesting record,) all English hertes and her naturall people must nedes praise God's mercy which hath sent them so woorthy a prince, and pray for her grace's long continuance amongest us.

On the following day, being the 15th of January, 1559, Elizabeth was crowned in Westminster Abbey. From the palace she proceeded direct to Westminster Hall, in great state. First went the trumpeters, knights, and lords, heralds of arms, in their rich coats, then the nobles in their scarlet, and all the bishops in scarlet; and then came the queen and all the footmen waiting upon her. At the hall her grace's apparel was changed; and there she met the bishop who was to perform the ceremony, and "all the chappel, with three crosses born before them in their copes, the bishop mitred, and singing as they passed *Salve festa dies.*" All the streets were new-laid with gravel and blue cloth, and railed in on each side. From the hall the queen proceeded to the abbey, where the coronation was performed by Owen Oglethorpe, Bishop of Carlisle, the only prelate who could be prevailed upon to undertake the office. The see of Canterbury was at this time vacant, Cardinal Pole, the last holder of it, having died in November, two days after Queen Mary; and the duty of performing the coronation devolved on the archbishop of York. Michael Heath, who then held that see, refused to assist in the office, as did all the other prelates, because Elizabeth had sufficiently declared her aversion to the church of Rome, both by proclamation and by admitting into her council men who had not the character of good catholics. Bishop Oglethorpe, however, was at last induced to officiate, notwithstanding the complaints of his brethren.

In Mr. Nichols's work is inserted from Ashmole's collections the following curious account of the *Cerymonies of the Coronacon of the moost excellent Queene Elysabeth.*

Item, fyrst her grace satt in a chayre of estate, in the middle of the church before the high aulter, and immediately her grace was conducted from the said chayre and lede between two lords to be proclaimed by a byshop, Queene of Inglande, at iiii placys, and the trompetts blowinge at every proclamacion. And immediately the Queen's Majestie was brought to the chayre of estate, and immediately hir grace was lede byfore the high aulter, and there sittinge a bysshop the Queenes Majtie kneeling before the bysshop and kissed the patyn, her grace offered money and the bysshop laid it in the basyne, and immediately offered a part of red sylke wherein the paten was covered. And immediately hir highnes sat in a chayre byfore the aulter, there being a bysshop in the pulpitt preaching a sermon byfore the Queenes Majtie, and all the lords spirituall and temporall. And after the sermon done the bysshop bade the beads her grace voyde out of the chayre knelynge and said the Lord's Prayer. And after that hir grace satt in hir chayre, and the bysshop gave her a booke, which she had, taking her oathe. And after that, the bysshop, knelynge byfore the aulter, red in two bookes, and hir grace gave a little booke to a lord to deliver unto the bysshop. And he received the booke. The bysshop retornyd the booke to the lorde, not reading the said booke and red other books. And immediately ye bysshop took the Queenes booke and red it byfore the Queene her grace. And after that hir grace kneeled byfore the aulter. And the bysshop red a booke byfore her grace. And immediately her grace went to shift her apparrell. And the bysshop sung the . . . . . of the masse in a booke which was brought in byfore the Queene, and then and there was a carpet with kussyns of golde spread before the aulter. And secretary Cycill delivered a booke to the bysshop, and there was a bysshop standing at the left hand of the aulter.

Item, the Queenes Majtie being new apparrelled came byfore the aulter and leand upon the kussene, and over her was spread a reed silken cloth. And then and there the bysshop annointed her grace. And yt done changing apparell her grace retorned and satt in her chayre. And there was a sword with a girdele putt over her, and upon one of her shoulders and under the other: and soe the sword hangeing by her side. And after that two gartares upon her hands; and then one croune put the bysshop upon her hedde, and then trompetts sounding, and the bysshop put a ringe upon her finger, and delivered the septre in her hand, and then after the bysshop satt a croune upon her heed and the trompetts sounding. And after that her grace offered the sword and laid it uppon the aulter and retorned kneelinge. And the bishop readeinge upon a booke, and shee haveing the scepter and a crosse in her hand, and after that her grace retorned to the chayer of estate. And then the bysshop put his hand to the Queenes hand, and read certaine wordes to her grace. And then the lords went up to her grace kneeling uppon their knees and kissed her grace. And after the lords had done the bysshops came one after another kneeling and kissing her grace. And that the bysshop began the masse, the Queenes Majtie haveinge the septer in the right hand and the world in the left hand, the Epystel red fyrst in Latyn and after that in Inglish. And after that the bysshop brought her grace the Gospell, which also was read first in Latyn and after in Englishe: and shee kyssed the wordes of the Gospell. And immediately after her Majtie went to the offering, and byfore hir grace was borne iii naked swordes and a sword in the scabbard, and hir grace kneelyng byfore the aulter and kissed the patyn and offered certain money into the bassyn, and then and there was rede to her grace certaine wordes. And then hir grace retorned into her closett hearing the consecration of the masse and her grace kissed the pax. And when masse was done, her grace removed behinde the high aulter, and then and there her Majtie changed her apparrell, and so her Majtie was conducted from the Abbey to Westminster Hall and there dyned.

The hall was richly hung, and everything ordered in "such roiall manner as to such a regall and most solemne feast apperteined." In the mean time, while her grace sat at dinner, Sir Edward Dimmocke, knight, her champion by office came riding into the hall "in fair complet armor," mounted upon a beautiful courser "richlie trapped in cloth of gold;" and in the midst of the hall cast down his gauntlet offering to fight on the queen's behalf with whomsoever should deny that she was the righteous and lawful queen of this realm. The queen taking a cup of gold full of wine, drank to her champion, and sent the cup to him for his fee, together with the cover.

Now after this, at the serving up of the wafers, the lord maior of London went to the cupboard, and filling a cup of gold with ipocrasse, bare it to the Queene, and kneeling before hir took the assaie, and she receiving it of him and drinking of it, gave the cup with the cover unto the said lord maior for his fee, which cup and cover weighed sixteen ounces of Troy weight. Finallie, this feast being celebrated with all roial ceremonies and high solemnities due and in like cases accustomed, took end with great joy and contentation to all the beholders.

On the following day, the 16th, were great joustings at the tilt in honour of the coronation; there being four challengers, of whom the duke of Norfolk was the first. On the 17th there was tourneying at the barriers at Whitehall.

The study of truth is perpetually joined with the love of virtue; for there is no virtue which derives not its original from truth; as, on the contrary, there is no vice which has not its beginning in a lie. Truth is the foundation of all knowledge, and the cement of all societies.—Casuerba.

RECREATIONS IN NATURAL PHILOSOPHY.

No. IV.

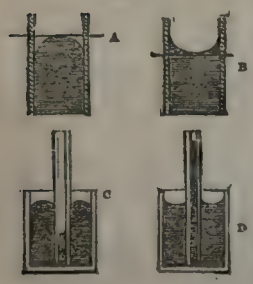
CAPILLARY ATTRACTION.

THE Latin word for a hair, such as the hairs of the head, is *capillus*, and a word derived from this has been applied to any tubes of which the bore is exceedingly small. When, therefore, any of our readers meet with the term *capillary* tube, they will understand that, although the term bears a very learned sound with it, yet it means nothing more than a fine hair-like tube. Glass tubes can be made less than one-hundredth part of an inch in diameter, and these are called capillary tubes. The term, however, is often applied to tubes considerably thicker than a hair.

Such tubes exhibit peculiar effects on liquids contained in them, and on liquids into which they are immersed. We all know that a liquid, under general circumstances, maintains a constant level at every part of its surface; and if we dip into a liquid a broad tube, open at both ends, such as a lamp-glass, the liquid will rise inside that tube to the same height as the level of the surface of the liquid outside, but no higher. These are circumstances with which we are so familiar, that we take no note of them; but when we thrust a tube of very small bore into a liquid, the liquid rises in the tube, but not always to the same height as the exterior surface of the liquid, sometimes higher, and at other times lower. The circumstance, or the property, which leads the liquid to rise to a greater or less height, is called *capillary attraction*; and the four little sections in fig. 1, will serve to illustrate different examples of this kind of attraction.

If we have two glass tubes, of equal size, A and B, which are stopped at the lower ends, and if we pour mercury, that is quicksilver, into A, and water into B, we shall generally find that the surface of the mercury in A will be round, or convex, or swelled upwards, as in the engraving, while the surface of the water in B will be sunken, or hollowed, or concave. Now this difference arises from the different way in which glass is affected towards the two fluids. Mercury and glass have a sort of repulsion for each other; they act as if they did not wish to come together. If we drop a little mercury on a piece of glass, it will not spread like water, but will remain as a small globe of mercury, so as to touch the glass as little as possible. Now it is for that reason that the top of the mercury in the tube is convex; the tube drives or repels the mercury from it, so that the latter is accumulated in a heap in the middle of the tube. A line drawn across the top of the little mound of mercury, shows how much it is depressed at the sides of that mound, on account of the repulsion of the glass.

Fig. 1.



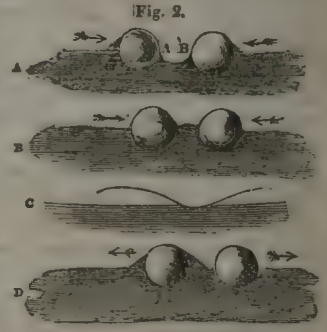
With the tube B, however, it is different. Water and glass have an attraction, or, if we may use the term, a liking for each other, and the glass draws the water towards it whenever an opportunity occurs. If we drop a little water on a clean piece of glass, it does not remain in globular drops like the mercury, but spreads out, as if to gain as large a surface of contact with the glass as possible. Now such is the case in the tube. The sides of the tube draw the water towards it all round, so that the centre is deprived of some of its water, and becomes depressed, or concave. If we draw a line across the centre of the surface of the water, we find that there is a considerable portion above the level, near the sides of the tube.

Suppose, now, that the tubes were a little larger than these, and that very small, or capillary tubes, were thrust down the middle of them, C will represent the effect when mercury is the liquid employed, and D when the liquid is water. If C be partly filled with mercury before the small tube is inserted, the surface will be convex, as before described; and on immersing the small tube, mercury will ascend into it, but not to the same height as the level of the mercury in the outer tube, and the mercury in both tubes will be convex at the surface. Here then we see that mercury, in accordance with the general principles that regulate liquids, ascends the inner tube, in order to gain the same level as the mercury in the outer tube; but it receives such a check from the repulsion which the glass manifests towards it, that it cannot attain that level, but remains at a lower level, as in the figure C.

Let us now turn to D. When water is poured into this tube, and the small tube immersed in the water, the water rises in the latter, not only to the same level as in the outer tube but still higher, while the surface of the water is concave, thus showing, in two different ways, an attraction between the glass and the water; for, after the water has ascended in the inner tube to the same level as in the outer, by the exercise of the ordinary property of liquids, it ascends still higher, by the attraction of the sides of the inner tube operating to draw it upwards. If the inner tube be not more than one hundredth of an inch in diameter, the water ascends, in this way, by capillary attraction alone, as much as four inches.

In fig. 2, we have the same facts proved by a different mode of illustration. Let A represent water, and A B two small balls, (made of any solid material which can be wetted by water,) placed upon the liquid surface, or suspended so as to touch and sink a little below such surface. When the balls are placed near each other, there will be a hollow, concave space between them, formed by the depression of the water, as shown at A B in the figure, and resembling the concave at B and at D in fig. 1. If now, by means of a feather, we wet the parts of the balls near the arrows, the water will flow up above the level, in the direction of the arrows, and wet the balls nearly to the top. If we move the balls nearer to each other in the direction of the arrows, the concave space between them will become more hollow.

Fig. 2.



In B, fig. 2, we have mercury, into which the balls are partly depressed, and the space between them then becomes convex, as in A C, fig. 1. If we move the two balls nearer together, the mercury between them becomes more convex.

C, fig. 2, represents the curve formed by the balls and the water; the former not being shown in the figure, in order to give a general view of the disturbance of the liquid surface, and its elevation above the liquid level.

In D, fig. 2, we have an interesting variation of A. One ball is completely wetted, and water rises up all

over it, producing a general elevation above the level of the liquid; the other ball is kept perfectly dry, by giving it a slight coating of grease or of varnish, and in this condition it repels the water around it, and produces the hollow, or depression, as shown in the figure. If the balls be moved along in the direction of the arrows, an elevation and depression will accompany them in the same manner as if they were stationary. We see, then, that, if one of the balls be kept dry, and the other allowed to get wetted, the water will rise up round the latter, and be depressed round the former.

Did any of our younger readers ever consider, how it is that the oil in our lamps becomes consumed? We put oil into a hollow case, and attach a wick of cotton, which partly dips into, and partly rises, above the surface of the oil, but we apply a light to the wick at some distance above the cistern of oil; how then does the oil ascend? We may reply, that if there were no such thing as capillary attraction, our lamps would be of no use to us whatever. Oil, like other fluids, has, in general, no tendency to ascend, and it does so in this case only on account of the peculiar attraction, of which we are now speaking. The wick consists of several filaments of cotton-thread, loosely twisted together, and in this form the intervals, or interstices, between them act like capillary tubes, up which the oil ascends. If we put a new wick and a new supply of oil into a lamp, we shortly see the upper extremity of the wick wet with oil; for it has ascended through the little channels between the filaments of cotton. As the oil burns away in the form of flame, more oil ascends through the wick, and thus a supply is kept up.

If we fill a glass-tumbler with water, and put one end of a skein of thread, or of a wick of cotton, into it, and let the thread hang over the edge of the glass, so that the other end shall be outside, the glass will be entirely emptied. The little filaments carry up the water in minute streams and channels, and when it has arrived at the edge of the glass, it follows the course of the thread down the outside of the glass.

If one end of a towel, or handkerchief, be placed in a wash-hand basin containing water, and if the towel hang over the edge, and have the other end outside the basin, the water will be conveyed from the basin in a similar manner to that in the last experiment. The towel, or the handkerchief, is made of woollen or silken threads, each of which is formed of a fibrous material, and the minute spaces between the fibres act as capillary tubes, and conduct the water through them. If a skein of cotton or of silk be placed partly into a glass-tumbler full of water, and the other part be placed in an empty tumbler near the first, the water will flow from the first into the second glass, until it is at the same height in both.

If we take a small square of glass, and dip it edgeways into a basin of water, we shall see that the water will slightly rise at the surface of the glass, but in so small a degree as to be hardly perceptible; but if we have two squares of glass, and place them face to face, but not absolutely touching, and then dip their edges into water, we shall find that the water will rise between them to a perceptible height: we have, in fact, a broad, flat, capillary tube, up which the water ascends. But the most pleasing way of producing this result is to place the pieces of glass in contact at one of their upright edges, and to let them gradually open towards the other upright edge. The water will then ascend to different heights between the plates, being highest at that side where the glasses are in contact.

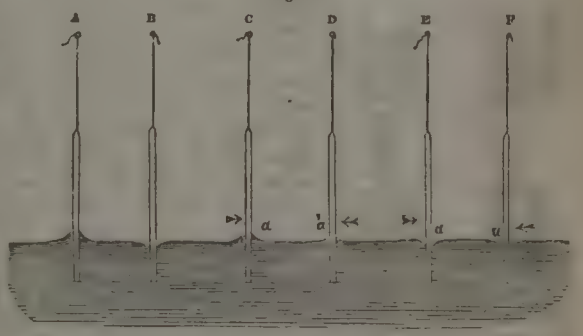
Fig. 3 may illustrate this. We have here two pieces of glass connected by hinges at the left edges, while the opposite edges are clasped by an instrument which allows us to vary the distance of the two plates: when the plates are a little opened at the edges, they are then in the condition of a book very nearly closed. If now the lower edges be dipped in water, the water will ascend to a considerable height near the hinges, and to a gradually decreasing height as we go from those edges to the edges which are a little opened. The water forms a curved line, called a *hyperbola*, which is represented by the darker lines of the figure. This experiment is more pleasing and striking if coloured water be employed. For this purpose we may drop some red or black ink into the water.

Fig. 3.

The means by which we know whether or not a solid and a fluid exert this sort of attraction on one another is by observing whether the fluid wets the solid, on immersing the latter in the former and drawing it out again. When we dip a piece of glass into water, and take it out again immediately, the glass is wetted, which is but another mode of saying that the glass has attracted the water. But if we dip the piece of glass into mercury, and take it out again, we find that the glass is not wetted: no mercury adheres to it, because mercury and glass do not attract each other. Also if we grease the glass, water will not adhere to, or be attracted by it.

The effect of attraction and repulsion, exerted in this way may be further illustrated by fig. 4. Suppose

Fig. 4.



we have water in a vessel and have plates of different substances suspended by threads: and suppose some of the plates have the property of attracting water, and others the property of repelling it. The left-hand figure A will represent the effect of dipping into the water a plate which attracts it: the water is raised a little on each side of the plate. The next adjoining one, B, is a plate having a repulsive tendency; so that on dipping it into the water, a depression is seen on each side of the plate.

Suppose now that we have two plates of the former, *i. e.*, the attractive kind, and that we dip them into the water near each other, as at C and D. There is, then, an elevation of water on each side of each plate, and as the plates are drawn nearer together, in the direction of the arrows, the surface of the water between them gradually assumes a concave form, which becomes more decided as the plates approach each other.

Lastly, if we have two plates with what we will call

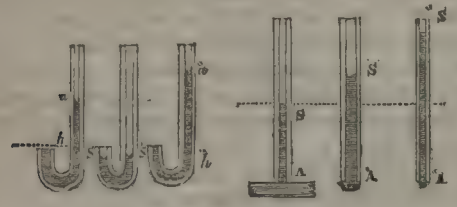
the repulsive tendency: on dipping them in near each other, as at E and F, the liquid is depressed at those two points; and on making the plates approach each other, the surface of the water between them will become more and more convex. If two dissimilar plates, such as D and E, be used, the water will rise round one and sink round the other.

We may frequently see that if a lump of white sugar be placed on a wet part of the table, the whole lump will become wetted. We may take a little water in a tea-spoon, and place a lump of sugar in it, when we shall see the water gradually rising through the sugar, until the latter is all wetted. This is wholly caused by capillary attraction. The sugar is full of minute pores, through which the water ascends. If water coloured with red ink be employed, the experiment becomes more pleasing.

The same may be said of a sponge. If we place the lower part of a sponge into water, the whole of the sponge becomes speedily wetted, by the ascension of the water through the little channels which pervade the sponge in every direction.

If we observe the mercury in a barometer, its surface is sometimes flat, sometimes convex, and sometimes concave. It is convex when rising, concave when sinking, and flat when it has just begun to sink. These various appearances greatly influence the observer in predicting any changes in the weather.

Fig. 5.



The various appearances of liquids in capillary tubes are collected in fig. 5. The first three tubes are curved at the bottom, the first tube is of unequal bore, being wider at the level *h* than in the straight part of the tube. If mercury be poured into it, the fluid will rise considerably above its level: it will rise to *a*, and form a convex surface. In the second tube the mouth S is wider than the straight tube, and the latter is larger than an ordinary capillary tube. If water be poured in, it will be concave at S, and rise in the straight part of the tube to S′, where it is also concave. But if the straight part of the tube be capillary, the water will rise up to *a*, as in the third tube, and its surface will be concave. The three straight tubes represent the elevation of different liquids above the level of the liquid into which they are plunged. The first straight tube represents one end in water, and the level at A is raised to S in the tube: the second straight tube represents a tube lifted out of the water, and the formation of a drop of that fluid at the bottom part of the tube: this drop is formed by the attraction of gravitation, which draws all bodies down to the earth; but in this case the drop will not fall, because the capillary attraction is superior to that of gravitation. In the third straight tube the level S is higher than in the other cases, because the tube is supposed to be narrower.

Capillary attraction is of vast importance in nature. By its means the sap ascends in trees, and at some seasons of the year the force of the ascent is so great that if a bough be cut off, from a vine for example, and a bladder be firmly tied to the mutilated stump, it will in a few hours become full of sap, and even burst if not removed. It has been remarked that timber trees which are cut during spring or summer, when the sap is in action, yield very bad timber, which would have been good if cut in the winter: the reason probably is that the sap decomposes, and thus injuriously affects the wood. Capillary attraction also influences the distribution of the animal fluids; and it extends its influence over mineral bodies, and greatly assists in their decomposition, and in the formation of soils. We see then that a small force, which is almost unnoticed and unknown by the great mass of mankind, becomes, when developed by the inquiries of science, one of the most important processes in the three kingdoms of Nature.

COTTAGE GARDENING.

IT is hardly possible to conceive that any one can travel through this country, without observing the number of gardens by the road side, cultivated by the extra industry of the humble tenants of the road-side cottages. The increase of these little allotments, considerable of late, can scarcely have failed to impress on any one the important addition these small plots give to the beauty of the scene. In a rich and populous country like England, it is in vain to look for the grander beauties of rugged and untamed nature. A traveller, amidst the scenes of English wealth, must rather expect to see moral beauty derived from proofs of order and industry, and from the evidence which these offer, of the comfort and the well-doing of the numerous human beings that meet his view, even in the most sequestered hamlets of this island.

If a traveller, as he passes along, is delighted with the appearance of a well-trimmed hedge, small crops of vegetables regularly planted, well and cleanly kept,—if he sees in them a promise of many a comfortable and wholesome meal to reward the care and industry of the humble owner of these riches, he will no less enjoy, likewise, the small plot of flowers, for simple ornament. The pendant honeysuckle with its fragrant flowers, or the rose-bud with its tufted blossoms, will delight, not his senses of sight or smell alone, but must carry him on to reflections still more gratifying than those mere senses can afford.

It is impossible not to draw from sights like these, a conviction of the comforts of his poorer brethren, of the pleasure which the simplest and most innocent sources of enjoyment are yielding them. These crops of useful and ornamental vegetation, declare that the owners, however humble be their lot, are not struggling through ill-requited toil, in the midst of penury, distress, and starvation, without enjoyments which they share with their wealthier neighbours; and greatly is it to be desired, that all such should be ready to recompense these cottagers for the cheap, yet real pleasure, that the view of the gardens afford them. The means of recompense are within the reach of every one. Let every one encourage and spread the love of gardening, till not a single person exists, willing to occupy his spare time in this way, unable to find something on which to bestow his care; and so withdraw him from amusements that, far from bettering his condition, degrade his moral and religious character, and diminish his means of present comfort and advancement.

If cottage gardens administer pleasure to travellers, or country residents, do those whom inclination or necessity lead to the more crowded haunts of the metropolis, or of our manufacturing or commercial towns, derive less gratification from the view of the pots of beautiful and gaudy flowers, with which, in many instances, the humblest dwellings are orna-

mented? Let any one who really feels an interest in the welfare of a human being, however lowly may be his condition, step in to such a dwelling: let even a lady do so, she *may* do it confidently. In such a dwelling, she will find nothing to shock, or to alarm, the most sensitive delicacy, the most refined sensibility;—but she will be most unfortunate, indeed, if upon the testimony of these silent witnesses, she does not find that neatness, order, cleanliness, comfort, and civility too, are the inmates of such dwellings. If, then, such be the almost insensible but certain effects of these harmless engagements, why does not every one encourage them? Why does not every one labour to promote so cheap, so innocent, so beneficial a pleasure? And every one, at the expense of a very little trouble, can do so. The modes in which each may do so are various: one may grant land; and let it be remembered that the most sterile bit of soil, in careful hands, will soon lose its barren character, and the great object in view will probably have been attained by the occupier in the course of that change.

In farms or gardens which are to furnish a livelihood for the occupier, the goodness of the soil, which will influence the price of the product, must be considered; in the present case we look for another kind of product, we look for health, for recreation, for innocent employment after the weightier occupations of daily toil. The production, then, of the soil, is here only a secondary matter. But even the barren spot does not belong to all persons; yet such as cannot add to the number of small gardens, may contribute from their own, or their friend's gardens, something towards improving the beauty, or the value, of those that belong to their poor neighbours. A few seeds, or a cutting of a plant, a few grafts of a valuable fruit-tree, or some buds, cost the possessor nothing, but, in truth, extend the gratification of his taste for the beauties of nature, by enabling him to see to the right and left those splendid productions of the vegetable world, which, but for such cheap though real kindness, must continue to be confined to his own domain.

Still if this is beyond the power of any individual, there are other means of advancing this good work, by the encouragement to be held out to small gardening efforts, by supporting Horticultural Societies and Exhibitions. These have become very numerous, and many, if not most of them, offer prizes to cottage productions,—vegetables, fruit, and flowers; several add prizes for instances of combined skill and industry in the cottages and gardens themselves. It is greatly to be wished, that these Societies were spread all over the country. No one who has not witnessed it could guess the important influence which these Societies exert upon the condition of the labouring poor, and he has only patiently to continue his exertions for a few years, and we are much mistaken if he will not begin to see his care and labour well recompensed by the silent, though sure, advancement of industry and comfort, and their certain attendants, sobriety and contentment. It has frequently been the lot of the writer of the present remarks to be asked, in a tone of peevish discontent, "What is to be done for the benefit of the poor?" To answer such a question fully, would require more space and time than could now be given; but whoever is really anxious for the information, may be assured that, until he has promoted, as far as possible, cottage gardening, he has not employed one of the simplest, readiest, and most effectual means of benefitting his poorer neighbours. The culture of flowers will prove no less *morally* useful than that of vegetables will, in a pecuniary point of view, be valuable. Even in the closest cities and towns, a love for, and skill in, raising a few geraniums or myrtles, or such other exotics as require pots, may be exerted for the ornament of the window of the lowliest residence, and by adding to the charms of home, retain many who would otherwise be wanderers from their own dwellings, to pass their time in beer-shops or pot-houses. B.

AN INCENTIVE TO THE STUDY OF BOTANY.

The vegetable creation, although inanimate, contains notwithstanding infinite beauty and perfection; and the more closely we inspect it, the more are we able to admire it, and to adore the wisdom of that Almighty Power which produced it. Nor are we to suppose, that man is to remain satisfied with the knowledge of the nature of this or that particular plant, simply because it is for his own immediate benefit. Far from it; on the contrary, it is our duty to have some knowledge of all God's works, as in them we can discover his wisdom and omnipotence. But, independently of this higher motive, we should think that the pleasure, much more the advantage, to be derived from such knowledge, would be a sufficient inducement. But there are some who would start the objection, that there are so many difficulties to obstruct their progress, as would render it useless for them to attempt it. The only answer we would give to such objections, as being an all-sufficient one, is that the study of botany is by no means difficult, as we hope we shall be able to show, to the satisfaction of our readers.

As the difference of the formation of various plants, or, in other words, the manner of classing them is the first step, we shall confine ourselves to that part only, feeling assured, that when our reader has proceeded so far, the pleasure he has derived from it will induce him to proceed to the minutiæ of botany. He must first then learn what are the several parts of a plant, as it is by the peculiar form or number of those parts, that we are able to assign a name to any plant. Our next lesson must be the different divisions into which all plants may be divided, viz., classes, orders, genera, and species. Having learnt this, we must proceed to discover the method of placing any plant in its particular class, order, &c., or, in other words, of naming it. We find that this is done by knowing the characteristics of the plant, and that the stamens are the index, as it were, of the class, the pistils of the order, and other peculiarities, such as the shape and colour of flower, or leaf, &c., of the genus and species; so that having found out all this, we are able, by this easy process, to discover what before seemed to us so difficult, viz., how to name any plant. But to take an example.

There are few who, in their walks over any sandy common, have not observed a little, blue flower, growing at their feet, almost inviting attention by its beauty and elegance, but we fear that there would be few who would feel curious about the name of that little flower; but we will not condemn our reader, but, on the contrary, suppose his attention to be arrested, and his curiosity excited. He plucks the little flower, intending on his return home to examine it and investigate its name. Knowing that the stamens designate the class, and the pistils the order, he proceeds to examine his flower, and finds that it has two stamens only. He is then sure that the plant belongs to some class or other, which is distinguished by having two stamens only, which

he finds to be *Diandria*. So that now, instead of having the whole range of botany before him, he is able to limit his search within the bounds of the class *Diandria*. He then resumes the examination of the flower, and finds that it has only one pistil, by which he knows that it belongs to the order *Monogynia*. But he still finds that this order has various genera, and upon further examination of his flower, he finds that it answers to the description of the genus *Veronica*, so that he has now found the class, order, and genus of the plant; but he has yet to find to which particular species of the order *Veronica* his flower belongs, which, by further comparison, he finds to have all the characteristics of the species *Officinalis*, so that he has found out its real name, viz., *Veronica officinalis*, or the Common Speedwell.

Such is the simple process of discovering the name of any plant. There will, of course, be limitations and exceptions, but to describe them would be beyond our limits. Our purpose has been simply to show our objector, that his scruples are formed on a false basis; and we can assure any such, that if he would only adopt the plan we have laid down, he would find himself more than amply repaid for his trouble, by the gratification of his labours being crowned with success.

SINGULAR DWELLING OF A SPECIES OF MOTH,

WHILE UNDERGOING ITS METAMORPHOSIS.

THE following curious provision for the safety of the grub of a species of moth is described and figured by Mr. Curtis in the *Transactions of the Zoological Society of London*. The specimen was found in

Fig. 2.

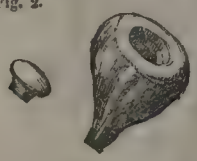


Fig. 3.

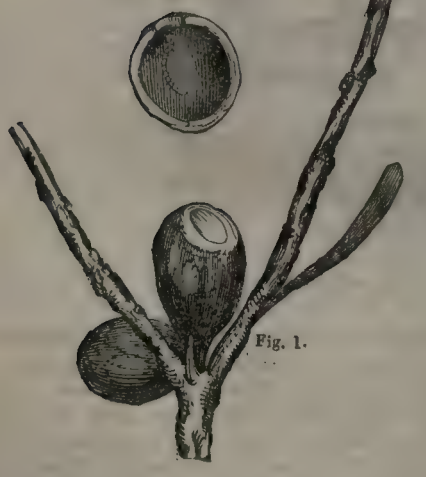


Fig. 1.

December, on a spot fifteen miles to the south of Monte Video, on the Rio de la Plata. The plant that bears the galls is a sort of underwood shrub, observed only in that part of the country, belonging it is supposed to a genus named *Celastrus*. The branch, fig. 1., shows the situation of two galls. They are frequently smaller, and sometimes five or six are clustered together, but never more than two appear to issue from one point. Those in the engraving are wrinkled, owing it is believed to their being in a young state when gathered. The galls arise where the attachment of leaves or flowers is indicated, and are therefore most probably produced by the transformation of the buds themselves. On the side of the gall is a round aperture, with an *operculum* (a little door) beautifully fitted to it, which may be easily picked out with the point of a penknife. (See fig. 2.) This operculum is equally convex with the rest of the gall, and is of the same thickness with it, but the diameter of the inside is less than that of the external surface, which forms a broader rim. Fig. 3 is a gall divided in two, to show its internal construction, and the situation occupied by the pupa, which is attached by its tail to the base, with its head close to the operculum, which of course gives way by the slight expansion or elongation of the pupa, when about to assume its winged state, and the skin is then left in the passage.

This curious provision of nature is rendered yet more singular from the fact that the gall-nuts we are acquainted with are generally caused by the operations of hymenopterous insects, many species of which are parasites on different kinds of plants.

In what way the operculum is formed, to fit so beautifully that there is little doubt, when the plant is alive, the place of opening would be with difficulty discovered, is a question that nothing but actual observation can solve. It may safely be inferred it is the operation of the caterpillar, since none of the galls wanted an operculum, and the existence of the dead pupa within them proves that it is not the work of the moth, and none of the butterfly or moth tribes have the power of biting, except in the caterpillar state. There is but one other instance known of a lepidopterous insect being the cause of a gall, and that apparently belonged to the same genus as the insect under consideration.

HAPPY the man who sees a God employed
In all the good and ill that chequers life.—COWPER.

CHILDISH, imbecile carelessness is enough to render any man poor, without the aid of a single positive vice.—WAYLAND.

WEALTH is not acquired, as many persons suppose, by fortunate speculations and splendid enterprises, but by the daily practice of industry, frugality, and economy: he who relies upon these means will rarely be found destitute, and he who relies upon any other will generally become bankrupt.—WAYLAND.

NEVER were the arts more nobly employed than by our forefathers, when they raised those beautiful piles, our Cathedrals, our Churches, our Universities, and our Abbeys, to the honour of that religion which God had given to man. It is lamentable to think how these majestic edifices fell before the blind zeal, the ill-directed means (however desirable the end), of the Reformation. A second havoc among ecclesiastical edifices, and scarcely less destructive than the first, arose from the fury of the fanatic and the miserable sectaries of the time of Charles the First.—Mrs. BRAY'S *Devonshire*.

. . . . . How full of cheer,
Joyous, devout, and grateful is the soul,
To see again its unexhausted God
Thus pile the table of a world with bread!
For what's the globe on which we all subsist?
The table of immortal bounty 'tis,
A feast perpetual, where unnumbered sons
Sit down to banquet as their sires withdraw,
And in succession generations feed,
Contented rise, give thanks, and pass away.—HURDIS.

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CHINA. No. IX.

CHINESE LADY, CHILD, AND ATTENDANT.

FILIAL PIETY OF THE CHINESE.

THE basis of the moral and political system of the Chinese is filial piety. The authority of a father over his family is the type of the authority of the emperor over the whole people; and it is as the general father of his subjects that the emperor claims their implicit obedience. The first of the "Four Books" inculcates that from the knowledge and government of oneself must proceed the proper government of a family; and from the government of a family, that of a province and a kingdom. The emperor is called the Father of the Empire; the viceroy is called the father of the province over which he presides; the mandarin, or magistrate, the father of the city which he governs; and the father of every family is the absolute ruler of his own household.

"The extent to which filial duty is carried by the Chinese," says Dr. Morrison, "is certainly a very leading feature in their character, and influences much all their reasonings about relative social duties. That those who are deficient in it will meet with their punishment in this world, is one of their doctrines. The proverb says, "The eaves' drop descends from a higher to a lower place, and a rebellious son will again beget contumacious and rebellious children." They otherwise express the same sentiment thus: "When in front of the eaves the rain-drop falls, drop after drop comes again on the mark of that which preceded it: he who is disobedient to his parents will have his own children imitate him."

"Of all the duties of the sons of men, there are none more important than serving one's parents during their life-time;" the other duties referred to

are those of sepulture, mourning, sacrificing to their manes, and so on.

Much of the Chinese reasoning on filial duty is built upon a saying of one of the sages, that "A man's body is the body of his parents descended to him." Not only is disobedience to his parents deemed a breach of filial duty, but every failure in attention to his own person, or the commission of any act which may bring disgrace or blame upon himself, is a want of filial duty, even although his parents may have been long since dead; because in disgracing himself he disgraces that body which he has derived from his parents, the very circumstance which ought to lead him to act so as to reflect honour upon them. In unison with this idea it is said, "A man's body, hair and skin, he derives from his parents; and not to dare to destroy or injure these is the beginning of filial duty."

The Chinese have works detailing at great length the various observances essential to the practice of filial piety, showing how parents are to be served during their life-time, at their interment, during the period of mourning, and subsequently by annual sacrifices at their tombs, or to a tablet dedicated to their memory. *Admonitions to the practice of Filial Piety* is the title of a tract given away at the temples of Buddha in China. It is headed thus: "Of all virtues filial piety is the first;" and begins with this sentence, "Filial duty is the root of all good actions." It winds up by urging children to beware of procrastination in performing their duty to their parents, for "the light and shade is but for a limited term," that is to say, time is short. There is a small classic on filial duty, ascribed to Confucius; it begins thus:

When father Chung-ne was sitting at leisure, and Tsang-tsze sitting by him, Confucius said, "The former kings possessed supreme virtue and important principles of righteousness, by the use of which they made obedient the people of the world, and kept in peace and harmony superiors and inferiors without resentments—Do you know these things?" Tsang-tsze rose from his seat and replied, "I, Tsan, am not clever; how should I be competent to understand these things?" After which Confucius said, "Behold! filial duty is the fundamental part of virtue," &c.

The ancient sage Mang-tsze, (or Mencius, as Europeans have Latinized his name), who lived about the same period as Xenophon and Socrates, said that there were in his days five ways, in which children showed a want of duty to their parents; first, by slothfulness; secondly, by gaming and drinking; thirdly, by a selfish love of gain, and an appropriation of it to their own wives and children, whilst they neglected their parents; fourthly, by gratifying their ears and eyes; and lastly, by wrangling and fighting.

The laws of China provide punishments for disobedience to parents and for neglect of them. When children or grand-children, are undutiful to parents, so that their father or mother commit suicide, a distinction is made by law, according as they have, or have not, irritated them by some gross offence. "Sons, or grandsons, opposing and offending against the instructions and commands of their parents," is the title of a section in the laws of China. It is followed by this provision, that any son or grandson who shall oppose and violate the instructions and commands of a grandfather or grandmother, a father or a mother, or shall be deficient in affording them support shall be punished by a hundred blows. It is stipulated, however, that the commands shall be lawful and just, and that ability to afford support shall be possessed; and it is required that the parents themselves prosecute. There is another provision, enacting, that if a son be poor, and unable to follow any occupation to afford support to his father and mother, so that his father and mother hang themselves, he shall receive a hundred blows and be transported three thousand *Le*.

There are "twenty-four cases of filial duty" which form a subject of comment in various popular tracts; and to illustrate them there are drawings cut in stone, from which fac-similes are taken for the use of schools. Each of these has an appropriate title, forming, as it were, the "moral" of the story to which it is prefixed. The first is entitled, *Filial piety influences and moves Heaven*; it refers to Yu-te-shun, a very ancient monarch who lived "during a period of much obscurity," upwards of two thousand years before the Christian era. "Shun was the son of a blind man; his father was stupid, his step-mother a scold, and his younger brother insolent; but he was able to harmonize them by his filial piety." Before he ascended the throne of China, which his predecessor resigned to him on account of his wisdom and virtue, he used to cultivate the land in the province of Shan-se; when "influenced by his virtues, the elephants tilled the ground for him, and the birds of heaven plucked up for him the weeds."

The title of the second case is, *He himself tasted every medicine.* This is said of the emperor Wan-te of the Han dynasty, who reigned from 174 to 151 B.C. During his mother's illness for three years, the emperor never closed his eyes; nor ever loosed the girdle of his raiment. That of the third is, *Biting her finger pained his heart;* and the object of the fable to which it is prefixed is to show the invisible influence that is exercised by a mother over a dutiful son. Tsan, a disciple of Confucius, was amongst the hills cutting fuel, when a friend called at the house; his mother bit her finger to rouse his attention and bring him home. At that very moment he felt a pain in his heart, and hastening home, fell down on his knees to ask his mother the cause: when she told him what she had done. This Tsan is the person who divorced his wife because she gave a pear insufficiently boiled to his mother.

Clad in a single garment he obeyed his mother, is the title of another, which refers to Min-keuen, whose mother died early, and whose father married a second wife who bore him two sons. This woman, during the winter months, in the northern parts of China, clothed her step-son with a single rush-flower garment, whilst she clad her own sons in cotton. Poor Min-keuen was driving his father's carriage one day, when he became so pinched with cold that he let the reins fall from his hand, whereupon his father chastised him. He would not vindicate himself, but bore the injury patiently. At last, however, his father found out what was the fact, and was about to divorce his wife, when the son remonstrated in the following couplet:—

Whilst mother remains *one* son is cold,
If mother leaves *three* sons will be destitute.

His father was persuaded to retain his wife, by which "the step-mother was excited to repentance, and also became an excellent mother."

The fifth title is this—*For a parent he carried rice on his shoulder.* This is said of Chung-yew, a disciple of Confucius. His family was poor, and to save for his mother's comfort, he himself ate the coarsest herbs, and carried rice for her use from the distance of a hundred *le*—about thirty English miles. After his parent's death Chung-yew became rich, and whilst taking a tour through the country attended by a hundred carriages and every luxury of that age, he set himself down, and sighing said, "Although I should now desire to eat coarse herbs and carry rice for my mother, it cannot be."

The next is *Play and embroidered garments were employed to amuse his parents.* This is affirmed of Laou-lae-tsze, a person of the Chow dynasty (606–242 B.C.) who, at the age of seventy, endeavoured by boyish tricks and play, to amuse his parents and make them forget their old age. *With deer's milk he supplied his parents,* is the title of the eighth case, which relates to Yeu-tsze, who also lived under the Chow dynasty. Both his parents became blind, and took a childish longing for deer's milk. Yeu-tsze clothed himself with the skin of a deer, and went amongst the ravines where deer herded together; and being concealed beneath the deer's skin, procured milk for his parents. The hunters, upon one occasion, deceived by his disguise, were on the point of shooting him with an arrow,—a risk which raised his reputation for filial piety. *He sold himself to bury his father—He hired himself to labour that he might supply every convenience to his mother*—and *He fanned the pillow and warmed the coverlet,* are titles of three other cases of which they express the leading feature.

The Gushing Fountain and the Leaping Fish is the title of a tale referring to Keang-she-tse, the wife of Keang-she; she lived during the Han dynasty, and is one of the most extraordinary of the instances of filial piety and devotion to the will of parents held up as examples by the Chinese. She showed the utmost duty to her own mother, and afterwards, in conformity to the usual maxims of the Chinese sages, to her husband's mother. The latter, in her old age, could eat of the carp only, and drink only of the water which was brought from the *Yang-tsze-keang,* or Great Yellow River; thither the obedient daughter-in-law willingly repaired every day to obtain a supply. Upon one occasion, however, she failed to do so, whereupon her husband, influenced by that extravagant devotedness to his mother which the Chinese admire, divorced his wife. Thus driven from her home, she worked night and day at weaving, and not only supported herself, but bought delicacies for her husband's mother, and sent them by the hand of an unknown person. This being discovered, her husband relented, and took her again into his house; and her son thenceforward became the bearer of the water from the river for the use of her mother-in-law. While performing this duty the boy fell into the stream and was drowned; Keang-she's wife, instead of upbraiding her husband and his mother, concealed the occurrence from the aged woman that her feelings might not be wounded. Finally, heaven, moved by such heroic self-control and respect for an aged mother, caused a spring to break forth by the side of Keang-she's cottage, which supplied both the water and the carp of the river without any effort to procure them.

The title of another case is, *He carved the wood and served his parents.* It refers to Ting-lau, who lived under the Han dynasty, and whose parents both died during his childhood. He carved wooden images to represent them, and served these inanimate figures as he would have served his living parents. His wife ridiculed him, and with her needle, in his absence, pricked the finger of one of the images, whereupon blood issued from it; and when the son of Lau appeared, the image shed tears. Lau found out the cause, and divorced his wife.

For his mother's sake he buried his child. This is said of Ko-keu, who had a child three years old, and an aged mother; from the poverty of the family his mother often suffered want of food. Keu said to his wife, "In the midst of our deep poverty it is impossible for us to feed both our mother and our child. We must, for our mother's sake, bury this child. We may obtain another child, but a lost mother cannot be replaced." The wife consented to the death of her child, and Keu forthwith dug a grave three cubits deep, when he suddenly saw a mass of yellow gold, on which was this inscription, "Heaven confers this yellow gold on Ko-keu, the dutiful son, and the government must not seize it, nor may any of the people take it from him."

On hearing thunder he wept at his mother's tomb. This is said of Wang-fow, who lived in the time of Wei, about 600 A.D. He served his mother with the utmost filial affection. During her lifetime she evinced a dread of thunder; and after her death, Wang-fow, whenever he heard the noise of thunder, immediately ran to her grave, knelt down, and with tears addressing her, said "Fow is here, mother, don't be afraid!"

"Alas!" may we exclaim, with Dr. Morrison, "what ignorance of 'life and immortality' is implied in this tale!"

Woo-mang fed the mosquitos, is the title of a tale referred to the Tsin dynasty. Woo-mang's father was so poor that he could not afford curtains to his bed, and in summer nights they both suffered much from mosquitos. The boy, in his eighth year, had such a dutiful feeling for his aged father, that he would not drive the mosquitos off himself, even when his skin was all over blistered, lest they should alight upon his parent and render him uncomfortable.

To apologize for the trivial and rather ridiculous nature of some of the "Twenty-four examples of filial piety," the Chinese say that the parties concerned were mostly simple people, poor, and uneducated, although most sincere. Several examples of great filial piety are recorded with much satisfaction by the Chinese historians, and some few examples of a great want of it are also recorded, and with very different feelings. The following is an instance of both cases: Wang-seu, a Chinese general, during the reign of He-tsung, finding provisions failing him on a march, gave orders that all the old and feeble should remain behind; if any presumed to disobey this order they should be put to instant death. The general's brothers, without his permission, ventured to take with them their aged mother. Wang-seu harshly reprimanded them, saying, "Every army possesses laws; no army can exist without them; not to destroy you for your disobedience to my order, is to render my army without laws." The brothers urged the peculiar case of their mother. The general became enraged, and issued an order to cut her head off. The brothers begged to be put to death first. The army interfered in their behalf, and procured a pardon. This is on record as an instance, on the one hand, of great filial piety, and on the other, of a total want of it.

THE YOUNG CHEMIST.

No. XII.

Let us now continue our examination of the action of heat upon fluids. We found* a great difference between the weight of *cold* and *hot* water, and I will now make a few simple experiments to impress this curious fact yet more strongly upon your mind, for you will find by and by that its practical applications are of very great utility.

First of all, I require a piece of thin glass tube about a foot long, and half an inch in diameter, closed at one end, not with a cork or any other kind of stopper, but *Hermetically closed.* Now, I dare say, that you do not know what I mean by this, and therefore I will explain it to you.

* See *Saturday Magazine* Vol. XI., p. 20.

A tube, or any other glass vessel, is said to be *Hermetically closed*, or *sealed*, when its aperture is heated to soften the glass, so as to allow of its being *welded* or *melted* together; the wonderful old Alchymists found out this ingenious plan, and constantly used it not only for securing the strong spirituous, or other costly contents of their glasses, from escaping, as they would do through common corks, or stoppers, but also to prevent inquisitive or dishonest people from examining or stealing them, it being impossible to do either without cutting the glasses with a sharp file, which led to instant detection.

The Alchymists called this *Hermetically closing*, or *sealing*, in honour of a fabulous personage named *Hermes*, whom they supposed was the founder of the art of Alchymy: the chief object of which delusive art (as perhaps you may have read in some of the pages of the *Saturday Magazine*) was the change of the common metals, such as lead and tin, into the precious metals gold and silver, this was called *metallic transmutation*, but was never effected, in spite of the immense labour, and toil, with which it was followed up for nearly eight hundred years.

I procured from the glass-house this piece of glass-tube, it is about eighteen inches long, and open at both ends, and will now show you how to close or seal it Hermetically.

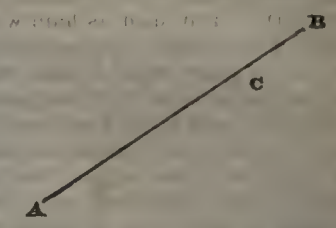
Here is the spirit-lamp which we have so often found useful in our former experiments, and its pale, though very hot flame, will soon soften the glass sufficiently for the purpose; I want the tube closed at about six inches from one end, so as to make it a foot long, and therefore at about this part, I pass it backwards and forwards, through the flame, so as to warm it gradually; for if I put it steadily and suddenly into the flame it would be almost sure to crack, just as you so often see a lamp-glass fly when suddenly put over the flame of a reading-lamp, because of the unequal expansion of its inside and outside, as already mentioned on a former occasion.* I keep on warming the tube in this gentle way for a minute or two, and then hold it in the flame, turning it round and round between my fingers, so as to heat it all round at the part where I wish to close it. Now it is quite red-hot and very soft, you see that I can easily bend it; but I wish to close it, and therefore gently pull the two ends of the tube,—the soft glass yields easily to the pull, and contracts in its bore. I still hold it in the flame, turning it gently round and pulling; and now see how I have drawn the sides of the large tube together,—it is very nearly closed, and by making the flame heat it fairly red hot, with one gentle pull it is done.

But the end is not nicely rounded, there is a little knot of glass sticking out, and to get rid of this, I heat the closed end red hot, and then putting the open end right between my lips, blow very gently into the tube,—the soft glass yields to the force of my breath, it expands, and the end is rounded, not so neatly certainly as a glass-worker could do it, but sufficiently so for our purpose; and when the tube is cool it will be ready for our experiment.

I must take care not to lay it down upon any cold surface, lest it should crack: and, therefore, set it with its sealed end uppermost in an ale-glass or a tall gallipot, so that it may cool slowly in the air. Whilst sealing the tube we had a good opportunity of observing the very bad conducting power of glass; I held the tube the whole time, between my naked fingers, and yet they were not burned, nor even would they have been burned if much nearer the red hot part; glass being such a bad conductor of heat. If I had held a metal tube in the flame for a similar time, my fingers would have been severely burned,—the metal being an excellent conductor of heat, and therefore soon becoming very hot from end to end.

The tube is now cool enough to be handled with safety, and I will fill it with cold water, within two inches of its top. I take hold of its closed end, and incline the tube so as to let the flame of the lamp heat the glass just below the surface of the water.

Let A B represent this position; A is the bottom of the tube, and B its top; C is the surface of the water. I heat it very gently at first, and stronger by degrees, until at length you will find that the water at the surface actually boils. Now it is boiling rapidly, and yet I am holding the other end of the tube in my naked hand, and I feel no heat; the water *below* the boiling surface is as cold as when I first poured it into the tube;—convince yourself of this by slowly passing your finger from the closed end towards the upper end, you feel no heat until within about an inch of the boiling water.



Now hear the reason of this. The *boiling hot water* is *specifically lighter** than the cold water, and therefore *floats* upon its surface, as a cork or any other light substance would do; the water is almost a non-conductor of heat, the glass tube is a very bad one, and these three circumstances combine to keep the water cold below.

Supposing the water a conductor of heat, we should be enabled to boil the whole contents of the tube by applying the heat at the surface, because (as we shall hereafter more particularly examine) conductors of heat allow it to travel in all directions, upwards, downwards, and sideways, with the same facility; but I may heat this surface, for a long time, nay actually kindle a flame on it, and still never heat and boil the water below.

Here is a tall ale-glass very nearly full of cold water, I will pour a tea-spoonful of spirit of turpentine upon it, which will float upon the surface, as it is a much lighter fluid than the water; I now inflame the turpentine by a bit of lighted paper, and place the glass on the hob of the grate, to carry off the thick, black smoke, so that it may not annoy us. Here then we have a flame, and a very fierce flame, actually burning on the surface of the water, and heating it as in our first experiment, whilst the water below remains cold.

Let us now return to the water in the tube, holding it at the top, and applying the flame of the lamp to the bottom, what will happen in this case? Why, the water at the bottom will become heated, and rendered *specifically lighter*, it will not remain at the bottom, it *ascends;* colder water *descends*, gets heated, and in its turn ascends, and these ascending and descending currents will continue until the water boils, and steam escapes.

Now the water is nearly boiling, and I can hold the tube no longer with my fingers, for it is so very hot; but by putting on a thick worsted glove, which is a bad conductor, I can manage to hold it without inconvenience, even when the water boils rapidly, which will be the case in a very few seconds.

Thus, then, do we heat water for all our domestic purposes, in kettles, saucepans, &c.; thus, also in brewing-coppers, steam-boilers, &c., not by its con-

* See *Saturday Magazine*, Vol. XI., p. 14.

* See *Saturday Magazine*, Vol. XI., p. 20.

ducting power, but by what it is now usual to call its *carrying power*,—a power brought into action by the application of heat to the *bottom* of the vessels containing the water. You cannot see these *carrying currents*, for they take place during the operation we have just performed; but I have prepared an arrangement which will exhibit them very satisfactorily.

It is a Florence oil-flask, (such as you may purchase at the oil-shops for a few pence); I washed it out with hot water and a bit of pearlash to clean away the oil and dirt, I then filled its bulb with clean water, into which I put a small tea-spoonful of magnesia, rubbed up into a paste with a little water: I tied a string round the neck of the flask, and hung it from this nail in the wall a few hours ago, leaving it perfectly quiet, so that the magnesia might settle to the bottom, as you see it has done. Now, upon applying the flame of the spirit-lamp at a little distance from the bottom, so that it may be gently heated, you will soon find that the magnesia begins to move. Its motions will render the currents evident to you, just in the same way as a feather thrown into the air shows you the direction of the wind,—watch it closely, some small particles are now slowly ascending, they are borne upwards by the currents of hot water, they travel a little way, become cooled, and fall, whilst others rise, and so on, as the heat increases.

Here, then, you have an opportunity of seeing the direction of the ascending and descending currents, which take place during the heating of water, but which escape notice, unless some substance is diffused throughout it, and the experiment made in glass vessels. When the water boils, the whole of the magnesia will be diffused throughout it; but perhaps this will take half an hour or more, and we should burn a great deal of spirit, which is very expensive. I will therefore take away the spirit-lamp, and place this lighted dining-table lamp under the flask, and so let the operation proceed.

The greater heat of this lamp warms the water very rapidly. You now hear a sort of bumping or cracking noise in the flask: this is a curious thing, but admits of an easy explanation, as follows:—

Thousands of small bubbles of steam are formed at the hot bottom of the flask, but instantly meeting with the cold water near them, they are condensed, that is to say they again form water, just as the steam from the tea-kettle does if you hold a cold plate to it, only these steam bubbles are very suddenly condensed, in thousands at a time, and thus a continued jar or shaking is produced against the bottom of the flask, which causes the noise: it becomes less and less as the water becomes hotter, because the condensation is not so rapid, and altogether ceases when the water boils.

You know very well that after a kettle full of water has been on the fire for some time, that it "begins to sing," as folks say; this singing is produced exactly as I have just described, and if you place your hand upon the handle of the kettle you will feel the shaking motion, it ceases,—and so does the singing when the water boils,—*steam* then escapes, and I shall speak of its wonderful nature hereafter.

THE HORNS OF DEER.

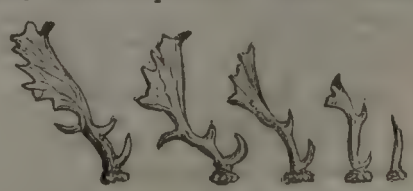
THERE are three species of Deer found in this country, namely,—the Red Deer, *Cervus elaphus*; the Fallow Deer, *Cervus dama*; and the Roe Deer, or Roebuck, *Cervus capreolus*.

The growth and the annual shedding of the horns of the Deer, is a very curious and interesting fact. The growth is an astonishing instance of the rapid production of bone under particular circumstances, for a full-grown stag's horn weighs about twenty-four pounds, and the whole of this immense mass of true bone is produced in about ten weeks. During its growth, the branches of the external carotid arteries (the large arteries which carry blood to the head), are considerably enlarged, for the purpose of conveying so large a supply of blood as is necessary for this rapid formation. These vessels extend over the whole surface of the horn as it grows, and the horn itself is at first soft and extremely vascular, so that a slight injury, and even merely pricking it, produces a flow of blood from the wound. It is also protected at this time with a soft, short, hairy or downy coat, which is termed the velvet. When the growth is completed, the substance of the horns becomes dense, the arteries become obliterated, the velvet dries and falls off in shreds, a process which is hastened by the animal rubbing his horns against the branches of a tree. After the pairing-season is past the horn generally loosens, and at last falls off, to be renewed again in the succeeding year. The growth of the horns of the Deer are an indication of the age of the animal. The following engraving shows the growth of the horn of the Red Deer. During the first year, the

HORNS OF RED DEER.

male Deer's horn merely attains the form of a rounded knob; from this it takes the name of *knobber*. In the second year the horns are long and pointed, and are called dags, and the animal has now the name of *brocket*; in the third year, the first of the "brow-antlers" has made its appearance, and the deer becomes a *spayad*; in the fourth the "bez-antler" is added, and he is then a *staggard*. He is a *stag* in the fifth year, when the third antler, or "royal," appears; and in the sixth the commencement of the "sun-royal," or crown, is formed, when he takes the name of *hart*, which he retains through life. At this time he is called a hart or stag. After the seventh year he is said to be *crooked*, or *palmed*, or *crowned*, according to the number of branches composing the sun-royal.

The young male of the Fallow Deer shows no signs of horns till the second year, when they make their appearance as simple "snags," and the animal is called a *pricket*; in the third year two branches are produced, and the top of the "beam" becomes flat-

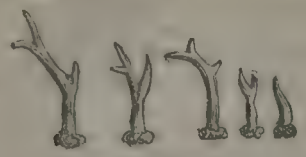


HORNS OF FALLOW DEER.

tened. The fourth year finds them more developed, and the flattened part deeply indented. In the fifth year, when he acquires the name of a *buck of the first head*, the horns have acquired nearly their full developement; but, in the sixth, some additional snags are added to the flattened part of the beam, which are called *spillers*, or *advancers*, and the palmate portion has become very broad.

The fawn of the Roebuck has no horns the first year; in the second they assume the form of prickets,

or snags; the third year the first antler is added, which stands forward; in the fourth year the second



HORNS OF ROEBUCK.

antler appears, which stands directly backwards; and in the sixth the horns have attained their full developement.

CHAPTERS ON CORONATIONS. No. VI.

HAVING described the services required at the coronation feast, we shall now turn to those which preserve the ancient forms of chivalry, far the most remarkable of which is the service of the KING'S CHAMPION. Trial by combat, as is generally known, was an essential part of British jurisprudence, and continued to be so until the beginning of the reign of George the Fourth, when there having been an appeal of murder, in the case of Abraham Thornton, he was advised, by his counsel, to claim his right of trial by battle. Accordingly, when brought before the Court of King's Bench, he flung down his gage. A solemn argument was afterwards held on the case, when the judges were unanimous that he was entitled to wage his battle. The nearest male relative of the deceased, a lad of sixteen, being manifestly unable to meet Thornton in combat, declined any further proceedings. The public feeling was so much outraged, that the Attorney-General immediately introduced a bill for abolishing the right of appeal in all criminal cases, which passed with little opposition. In former ages the gravest authorities of our law sanctioned the form of trial by wager of battle, quoting as a precedent "the combat between David, for the people of Israel of the one party, and Goliah, for the Philistines of the other party." Pope Eugenius the Third issued a bull, declaring that the ancient usage of wager of battle was an appeal to the judgment of God, and as such should be reverenced and adopted by Christians. It is, therefore, not surprising that we should find the claim to the crown itself in some degree put in issue by an appeal to judicial combat.

The office of Champion was established in England by William the Conqueror, immediately after the battle of Hastings: he conferred the dignity on Robert de Marmion, lord of Fontenay, in Normandy, and hereditary champion to the sovereigns of that duchy; and he gave him the manors mentioned by Sir Walter Scott, on the tenure of the championship. It was on this account that the heralds hailed the imaginary Lord Marmion by the titles which really belonged to the Marmion family.

> They hailed him lord of Fontenaye,
> Of Lutterworth, and Scrivelhaye,
> Of Tamworth tower and town.

The championship was annexed to the manor of Scrivelhaye, or Scrivelsby, in the county of Lincoln; but when the fifth baron de Marmion died without male heirs, in the 20th year of Edward the Second, and his inheritance was divided among his daughters, a doubt arose whether the championship was annexed to the manor of Tamworth or to that of Scrivelsby; at the coronation of Richard the Second the question was decided in favour of the latter, and Sir John Dymoke, knight, performed the office. The championship has now continued in the Dymoke family for more than four hundred years, and the counter-claim of the lords of Tamworth has never been renewed. In allusion to this office the Dymokes have taken the punning motto, "PRO REGE DIMICO," *I fight for the king*.

The champion claims to have, on the coronation day, one of the king's great coursers, with a saddle, harness, and trappings of cloth of gold, and one of the best suits of armour, with cases of cloth of gold, and all such other things appertaining to the sovereign's body, as the sovereign ought to have if personally going into mortal battle. And on the coronation day to be mounted on the said courser, trapped and furnished as aforesaid, being accompanied by the High Constable and Marshal of England, and the royal herald, with a trumpet sounding before him, to come riding into the hall to the place where the sovereign sits at dinner, and there, in the presence of the said sovereign, and in the hearing of all the people, after the trumpet hath made three solemn proclamations, one of the royal heralds to proclaim with an audible voice these words following, or words to the like effect, that "If any person, of whatsoever degree he be, either high or low, will deny or gainsay that——, next heir of our late sovereign, —— ——, deceased, who was rightful king of the realm of England, ought not to enjoy the crown thereof, here is his (or her) champion, ready by his body to assert and maintain that HE LYES LIKE A FALSE TRAITOR, and in that quarrel to adventure his life on any day that shall be assigned him." And thereupon the said champion throws down his gauntlet; and in case no man shall say that he is ready in that quarrel to combat, then, as hath been usually done at all former coronations of kings and queens of this realm, after the before-mentioned words, "If any one will deny or gainsay that the king (or queen) ought not to be crowned," are proclaimed, the sovereign drinks to the said champion, in a gold cup with a cover. The fees claimed by the champion for this service are the great courser, with its harness and trappings, as above mentioned, as also the above-mentioned armour and trappings of cloth of gold, and the gold cup out of which the sovereign drinks to him, together with its cover. These claims have been invariably allowed.

It appears, from Froissart's account of the coronation of Henry the Fourth, that the champion of that day had some expectation of meeting an adversary. "When dinner was half over," he says, "a knight of the name of Dymock, entered the hall completely armed, and mounted on a handsome steed, richly barded with crimson housings. The knight was armed for wager of battle, and was preceded by another knight bearing his lance; he himself had his drawn sword in one hand, and his naked dagger by his side. The knight presented the king with a written paper, the contents of which were, that if any knight or gentleman should dare to maintain that King Henry was not a lawful sovereign, he was ready to offer him combat in the presence of the king, when and where he should be pleased to appoint. The king ordered the challenge to be proclaimed by the herald in six different parts of the town and the hall, to which no answer was made."

It was a constant tradition among the Scottish Jacobites, that the Young Pretender personally witnessed the coronation of George the Third, and that one of the partisans of the House of Stuart on that occasion took up the champion's gauntlet, leaving his own glove in its stead, with a written acceptance of the challenge. Sir Walter Scott has introduced the incident in his romance of *Redgauntlet*, but it does not seem to rest upon any valid evidence. In one of the magazines of that day, it is said that a lady in the

gallery accidentally dropped a silk glove, which the herald took up, and jocularly handed to the champion, who in a similar spirit asked, "Who is my fair opponent?" But even this anecdote was contradicted, by the herald.

At the coronation of George the Fourth, in 1821, a question was long agitated in the Court of Claims, as to the right of the champion to appoint a deputy, in case of his own personal incapacity, either through age or profession; for the head of the Dymoke family at that time was in holy orders. It was at last determined in favour of the claim, subject to the royal approval, and Mr. Dymoke's nephew, an officer in the Royal Navy, appeared as his representative.

The Lord Grey de Ruthyn, by right of descent from the earls of Pembroke, carries the king's great spurs, before him on the day of coronation. Pembroke was a county palatine, and the services of carrying the spurs, like the extinct services of carrying the swords, belonged only to palatine dignities. The bishop of Durham, as a count palatine, not as a prelate, claims the privilege of supporting the sovereign on the day of coronation.

The lord of the manor of Worksop in the county of Nottingham, which has been recently sold by the duke of Norfolk to the duke of Newcastle, holds his estate by the service of finding the sovereign a right-hand glove at his coronation, and supporting his right arm that day so long as he shall hold the sceptre in his hand. This honourable service was anciently annexed to the manor of Fernham in Buckinghamshire, which was held by the Lords Furnival. From the Furnivals the manor of Fernham descended to the Talbots, earls of Shrewsbury, who exchanged it with Henry the Eighth for the manor of Worksop, but reserved the right of service. Worksop passed to the Howard family in the female line, and the service has since then been performed by the dukes of Norfolk, or their representatives.

The lord of the Isle of Man claims the privilege of presenting two falcons to the sovereign on the day of coronation; and as this claim is connected with some remarkable portions of English history, we shall briefly relate its origin. Magnus the Third, king of Norway and Man, was the last Norwegian monarch who held that island. He died without issue; and Alexander the Third, king of Scotland, partly by force of arms, and partly by a liberal distribution of bribes among the Manx nobles, brought this and many of the western islands of Scotland under his obedience. The English monarchs were by no means pleased to find the kings of Scotland in possession of an island which might enable them to command the commerce of the Irish Sea, and made several efforts to make themselves its masters. At length, in the year 1340, William de Montacute, earl of Salisbury, who was descended from the old Norwegian kings of Man, won the island from the Scots, and sold it to William, Lord Scrope, earl of Wiltshire, and lord high-treasurer to King Richard the Second. Lord Scrope was attainted of high-treason in the first year of Henry the Fourth, and the island was then granted to Henry de Percy, earl of Northumberland, the father of Henry Hotspur, for his services in raising the Lancastrian family to the throne. He was to hold it in grand sergeantry, "by the service of bearing on the days of the coronation of the king and his heirs, at the left shoulder of him and his heirs, by himself or his sufficient and honourable deputy, that naked sword with which King Henry was girded, when he arrived in the port of Holderness, called Lancaster sword, during the procession, and for all the time of the solemnization of the coronation aforesaid."

In the fourth year of Henry the Fourth, the Percies, dissatisfied with what they deemed the stinted measure of gratitude meted out to them by a monarch who was indebted to them for his crown, raised the standard of revolt, but were completely defeated and immediately attainted. Henry then granted the island to Sir John Stanley and his heirs for ever, "with all the royalties and franchises thereto appertaining, and the patronage of the bishopric there, with the style and title of *King of Man*, in as full and ample manner as it had been granted to any former lord thereof; to be held of the king, his heirs, and successors, by liege homage; rendering to the said king two falcons, once only, viz. after the homage done; and rendering to his heirs, kings of England, two falcons on the day of the coronation of his said heirs, for all other services, customs, and demands, as freely, fully, and entirely, as William Scrope, knight, or any other, held the same."

Early in the last century the kingdom of Man descended to the baroness of Knockyn, who was lineally heiress to Sir John Stanley. She married the duke of Athol, and thus the kingdom of Man was united to that duchy. The royalties of Man were sold by the duke of Athol to the English crown under the authority of an act of parliament, but he still holds the lordship of the island by the same honorary service of rendering two falcons on the day of the coronation of the kings of England.

The barons of the Cinque Ports, that is to say, sixteen barons or free men from the towns of Hastings, Dover, Hythe, Rye, Sandwich, Romney, and Winchelsea, have since the coronation of Henry the Fourth established their claim to carry over the sovereign, during the procession, a canopy of cloth of gold, supported by four staves covered with silver, and having four bells of silver gilt at the corner; receiving the canopy, &c., as their fee, and having the privilege of dining at a table on the right hand of the sovereign.

The dean and chapter of Westminster, as successors to the abbot, have established their claim to instruct the sovereign in the rites and ceremonies used at the coronation; to assist the archbishop of Canterbury in celebrating the divine service appointed for that day; to have the custody of the coronation robes; to have robes for the dean and his three chaplains, and for sixteen ministers of the said church; the royal habits put off in the said church, the several oblations and furniture of the church, and the cloth on which the sovereign walks from the west door to the theatre.

The sergeants-at-arms escort the Regalia during the procession: the sovereign is guarded by the honourable band of gentleman pensioners, or gentlemen-at-arms, and the procession is closed by the yeoman of the guard.

In early ages, the sovereign, shortly after his accession, issued a warrant constituting the lord high steward sole judge of a court therein directed to be held, called the Court of Claims, to which all persons who held estates by grand sergeantry were to state the nature of the services they were bound to perform, and the fees to which they were entitled. Afterwards others of the Council, and the officers at arms, were directed to assist him with their advice, and by the proclamation of her present Majesty, the duty was committed to the whole of the Privy Council, "or any five or more of them." By these the usual claims were allowed; but in consequence of the procession from Westminster Hall, and the banquet in Westminster Hall, being dispensed with, many of the services were not required.

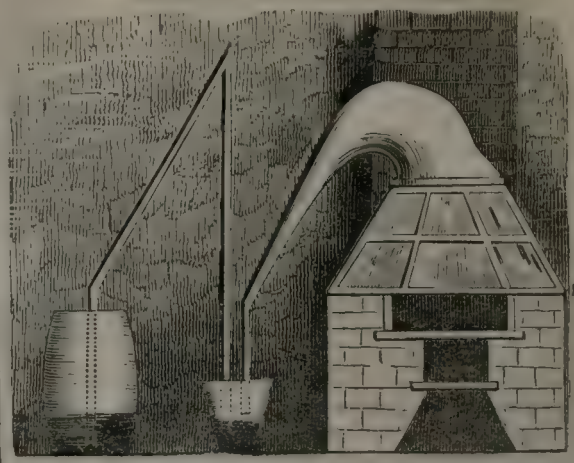
THE ART OF GILDING.

THE process of gilding on metal is known by the name of water-gilding: it is applied to the purpose of gilding metal buttons, the cases, and the works of watches, and, on a larger scale, in the manufacture of those splendid articles in *or mólu*, for which the French are so famous. For these purposes the gold is thus reduced to the state of an *amalgam*. A small quantity of gold in grains, as sold by the refiners, is put into a crucible, or an iron ladle, with about six times its weight of mercury, and being placed over a charcoal fire, the mercury soon dissolves the gold. After the amalgam is made, it is thrown into water, where a part of the mercury separates itself; but the remaining mass, which is the real amalgam, still contains many small portions of mercury, which contain but little, if any, gold. To separate this, the amalgam is screwed up in a piece of wash-leather, and being squeezed gently with the finger and thumb, the superfluous mercury is drained off, and the remaining mass consists of about two parts of mercury, and one part of gold.

In preparing the metal to receive the gold, it is necessary that it should be perfectly cleared of all tarnish, grease, or other extraneous matter. To effect this, it is *pickled* in a mixture of about seven parts of water to one of aquafortis; or, if the work is wanted quickly, four parts water to one of acid may be used, but its action must be carefully watched. The work is then cleaned with a *scratch-brush*, made of fine brass-wire instead of hog's hair.

The next process is to spread the amalgam equally over the work. To effect this, a liquid mixture called the *quickening* is prepared, consisting of aquafortis, in which a small quantity of mercury has been dissolved; the work being dipped into this preparation, its surface is instantly covered with a thin coating of mercury. The amalgam is now applied by means of a piece of flattened copper wire, called the *pencil*, and in consequence of the preparation, it spreads without difficulty. In common work, such as button-making, a quantity of the amalgam is mixed up to the consistence of syrup with aquafortis, and the articles are dipped into it; but no more must be prepared than is necessary for the occasion.

The amalgam which is spread over the surface consists, as we have seen, of mercury and gold. It is now necessary to get rid of the mercury, and leave the gold spread equally over the work. This part of the business is called *drying-off*, and is effected by submitting the article to sufficient heat to convert the mercury into vapour. The furnace used for this purpose is built in front of a common chimney. Suppose A to be the chimney or flue connected with the outer air, the furnace, represented in the engraving, is built in front, and the flue of its fire is connected with that of the chimney. Over the fire, a thick iron plate B is placed, which is heated by the furnace, and above this plate is a framework of iron, glazed in front; an opening being left on each side to admit the arms of the operator. The use of the glass is to prevent the deleterious fumes of the mercury being inhaled by the workman. A kind of still-head is fixed to the top of the glass screen connected with a bent pipe, which descends into a vessel of water; the vessel being closed at the top, the pipe nearly reaches the surface of the water, but does not touch it. A portion of the fumes of the mercury, which rise from the work, as the heat changes the metal into the state of vapour, are condensed in their passage along this tube, and fall to the bottom of the water as fluid mercury: those which are not yet condensed, ascend the second pipe, and passing over its bend, reach the water in the second vessel, in a metallic form.



The gilder, who sits before this stove, places the work on the heated plate. The effect of the heat is to convert the mercury into vapour. When the evaporation of the mercury is completed, the work assumes a dull yellow colour. The scratch-brush is now brought into requisition, and the work is well brushed with it in a shallow wooden trough, filled with beer-grounds or small beer. The acidity of the liquid has, perhaps, some effect in clearing away the remaining parts of the mercury; but its chief use is to prevent the brush scratching the work. Sometimes the work is double gilt, but the scratch-brush must be applied between each gilding, to prepare the surface for the reception of the amalgam.

At other times it is considered expedient to heighten the colour of the gilding, and several plans are resorted to for this purpose. The work is again placed on the fire, and subjected to a considerable degree of heat: it is then plunged into a weak solution of aquafortis in water, and again cleaned with the scratch-brush. At other times, a composition called *gilding-wax* is used: this consists of equal parts of bees'-wax and red chalk, with small portions of alum, verdigris, and green vitriol. With this composition the work is covered, and held over the fire until the wax smokes, and is about to inflame: it is then suddenly cooled in water, and the composition is cleaned by the scratch-brush in the beer-trough.

When the effect called *dead*, or *mat gold*, is required, the work is heated in the furnace, and plunged into an acid solution, such as aquafortis and water. In gilding watch-cases, it is necessary to polish the gold with a burnisher of agate, or some similar substance, which is done in water to prevent the covering of gold being rubbed off.

Iron or steel have so little affinity for mercury that they cannot be covered with gold by means of the amalgam, unless previously coated with copper. This is done by plunging that part of the metal which is to receive the gold into a strong solution of sulphate of copper, (blue vitriol.) The vitriolic acid having a greater affinity to iron than to copper, dissolves the former metal, and precipitates the latter.

TRUTH will be uppermost, some time or other, like cork, though kept down in water.—SIR W. TEMPLETON.

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THE WYE AND MONMOUTHSHIRE. No. IV.

REMAINS OF GOODRICH CASTLE.

GOODRICH CASTLE—GOODRICH COURT—LYDBROOK COURTFIELD—WELCH BICKNOR—COLDWELL'S ROCKS—SYMOND'S YATT.

THREE miles below Ross, on the left, stands *New Hill Court*, a large and roomy mansion, and on the right bank at no great distance beyond, *Pencraig*, crowning the brow of a steep eminence at a sudden turn of the river, and embracing a lovely view of Ross, mellowed by distance. After gliding onwards for another mile, the tourist beholds that singularly interesting ruin GOODRICH CASTLE, crowning a bold eminence clothed with trees in the most picturesque grouping. The river here makes one of its most graceful and brilliant sweeps, and the landscape is one of the finest along its course. It is difficult, indeed, to conceive any scene more exquisitely beautiful, than Goodrich presents, whether viewed from a boat, or from the height on which rest the massive remains of the aged ruin. A steep pathway through the wood, from the edge of the river, leads to the castle, the exterior of which, on a near approach, we agree with Mr. Roscoe, "is less striking than that of many other castles, except the gateway, which is eminently beautiful*," and the most curious and perfect front. The Anglo-Saxon keep, evidently the most ancient portion, is a fine specimen of castellated architecture; and owing to the amazing thickness of the walls, it has fortunately been tolerably well preserved from the assaults of time and the spoiler. Several of the towers are richly decorated by ivy, that "adorner of the ruin," as well as by clematis, which add greatly to the general effect. A beautiful pointed archway, part of the chapel in the interior of the castle, is exceedingly graceful, and from a breach in the wall beyond, there is a very sweet view of Goodrich Court, the residence of Sir Samuel Rush Meyrick, the eminent antiquary.

Much of the ancient history of the castle is lost in obscurity, but we find that a Doomsday proprietor, of the name of Godric, held a fort which commanded the ford on the river here before the Conquest, from whence it is probable that the castle derives its name. In 1165, William Marshall, Earl of Pembroke, held it, and sixty-five knights' fees belonging to the honour of Chepstow; and this noble was the feudal lord of the whole district from Ross to Chepstow. The castle in its earliest days consisted only of the keep, since which, the courses in the masonry, and the various styles of architecture in the round towers and other parts, abundantly testify that many additions were made at subsequent periods, the latest of which appear to be of the time of Henry the Eighth. It was anciently a seat of the Talbot family, and in 1347, Richard Talbot, lord of the castle, founded a

* Roscoe's *Wanderings in South Wales.*

priory of black canons at Flansford, in the neighbourhood. Goodrich was a very strong and important fortress during the civil war, and successively taken and retaken by the opposing parties. In 1646, it was garrisoned for the king by Sir Richard Lingen, who defended it with great gallantry and resolution against Colonel Birch and the Parliamentarian forces. The leaguers commenced a close siege on the 10th of March, and the castle did not surrender until the beginning of August following. It was afterwards dismantled and "slighted," (as stated in the records of the period,) by order of the Parliament, since which it has been "silently decaying."

And thou proud Goodrich, changed and worn,
By time and war, and tempest torn,
Still stand'st thou by that lovely stream,
Though passed thy glory like a dream;
Stand'st like a monitor, to say
How nature lives 'midst art's decay;
Or, like a spectre, haunting yet
The spot where all its joys were set.

Time hallowed pile! no more, no more
Thou hear'st the hostile cannon roar;
No more bold chiefs thy drawbridge pace
To battle, tournament, or chase;
No more the valiant man thy towers;
No more the lovely grace thy bowers;
Nor bright eyes smile o'er the guitar;
Nor the trump stirs bold hearts to war.

The falling meteor o'er thee shoots;
The dull owl in thy chambers hoots:
Now doth the creeping ivy twine
Where once bloomed rose and eglantine;
And there where once in rich array,
Met lords, and knights, and ladies gay,
The bat is clinging to those walls,
And the fox nestles in those halls.

Let us now proceed to visit the unique and castellated mansion which crowns the opposite height—GOODRICH COURT, the seat of Sir S. R. Meyrick, whose magnificent collection of ancient armour is well-worthy of inspection. The elevation embraces examples of the styles in use in the period between the reigns of Edward I. and Edward III. "The surrounding battlements, turrets, loop-holes, and machicolations look bristlingly on the defensive, while the small, dry moat, laid with velvet turf, and the fair flower-beds perfuming the quiet air around, are out of keeping, though agreeably so *." By the kind permission of the worthy owner, free access to this interesting mansion is cheerfully accorded to the public at all times. There are some fine paintings in the dining-room and several of the other apartments. The library is adorned with oak carving, which, with two miniatures by Holbein, enclosed in exquisitely carved ivory frames, particularly attract attention. The antiquities of different ages and countries are arranged with exceeding taste and skill in the various apartments.

The Wye, after passing Goodrich Castle, takes so bold a turn, that the ruined fortress remains long in sight—a memento for the moralist. On the right may be seen the crumbling fragments of FLARESFORD PRIORY, the chapel of which has been converted into a barn. At KERNE BRIDGE, the banks of the river assume a new and grander aspect, gradually rising into steep woody eminences, occasionally intermingled with beautiful slopes of verdant green. Upon the right side Coppet Wood, with its bold swells and hollows, exhibits a fine effect of light and shade, and on a more gradual rise to the left stands Bishop's-wood House, with cottages, fields, and orchards, rising amphitheatrically above each other. Both sides of the river are here steep and woody; and the tall and distant spire of Ruar-dean church may be distinguished amidst the trees on the left bank, whilst the deep umbrage of the "Forest†" hills, which here rise in lofty grandeur in the front, confer an almost indescribable charm on the landscape.

A streamlet called Bishop's brook, which empties itself into the Wye at this spot, divides the counties of Hereford and Gloucester. At Lydbrook, is a large wharf, where coals brought on a steep tram-way from the Forest of Dean, are shipped for Hereford, Ross, and other places. In the background is a rich woody hill, and there is sometimes a degree of bustle about the place which is pleasing from its variety. A turn of the river brings us to Courtfield House, a modern mansion, said to have been the site of an ancient building where our fifth Harry was nursed by the Countess of Salisbury, whose effigy some antiquaries have pretended to discover on a tomb in Welch Bicknor church, just below Courtfield. Sir Samuel Meyrick, has, however, pronounced the costume on the monument to be of the era of Edward the First. Rosemary Topping, a picturesque eminence, so called from the mellow luxuriance of its sides, leads us to that "majestic piece of rock scenery," the COLDWELL ROCKS.

These magnificent and, in some parts, precipitous masses of limestone rock, overhung with oak copse and underwood, present at their commencement—about two miles from Welch Bicknor, on the left bank of the river—an insulated appearance, rudely resembling the donjon tower of some ancient fortress. A wall of rocks of irregular outline, somewhat similar to the much admired St. Vincent's range at Clifton, next succeeds, and displays stern and sometimes fantastic masses, scathed and weather beaten, here and there relieved by many coloured lichens, and stunted shrubs. The river at their feet is deep, dark, and solemn, and the effect, more especially by moonlight, is wild and romantic in the extreme. The opposite bank is a succession of steep, woody slopes, terminating in a hilly common of brown and uncouth aspect, though occasionally relieved with an oasis of verdure. The lofty and abrupt rocky promontory which terminates the Coldwell range, is called SYMONDS (or CYMONS) YATT. The ascent from the river, by a "winding rocky road, between high banks, under arches of hazels and underwood," commands several exquisite bits of landscape. The summit once attained, a scene of electrifying beauty, especially if the day is sunny and cheering, bursts upon the sight. In the foreground, the attention is occupied by a picturesque view of Goodrich village and church; beyond which rise the spires of Ross, and of several village fanes;—now and then a glimpse is caught of the placid Wye, pursuing its "devious way" through a richly-wooded and fertile country; the beautiful, undulating outline of the Malvern hills partly fills the background, and more to the left the mountains of Radnor and Brecknock loom darkly.

The morris dancers of Monmouth, the Forest of Dean and Lydbrook, generally assemble at Cymon's Yatt, at Whitsuntide, to celebrate their annual "revels" on its summit—a verdant carpet of turf, with a natural barrier of rocks and underwood. Last year (1836) the "revellers" contended for the possession of the post of honour, and a serious conflict took place, the result of which was that several of the combatants were carried off the field, very seriously injured. Affairs like this, however, rarely occur at the celebration of this curious old custom. Traces of Offa's dike may be discerned in the Forest about a mile from Cymon's Yatt.

* Roscoe's *Wanderings*.

† Forest of Dean.

RECREATIONS IN NATURAL PHILOSOPHY.

No. V.

On Perpetual Motion.

An amusing, but at the same time a melancholy and instructive history might be formed, of the various visionary schemes which, in all ages, have disposed some enthusiastic men to dissipate their time and fortune in seeking to obtain some object, which should either confer boundless riches on its possessor, or shield him from all the ordinary accidents of life. The alchemist who sought for the art of transmuting the baser metals into gold, was not a greater visionary than the mechanist who sought, or who seeks, for the "Perpetual Motion." In the same class likewise we may place the geometer, who aims at the impossible achievement of squaring the circle.

Most persons have a vague and incorrect idea of the real nature of the difficulty and futility of the question before us. The writer has frequently met with well-educated persons, who, on seeing the beautiful motions produced in electro-magnetism, exclaim, "Why, this is perpetual motion!" But this is an incorrect application of the term. If by it we mean "the production of a machine which, being once set in motion, shall go on, without stopping, until it is worn out," then we admit that such a machine can be produced. A common water-mill will continue to move until worn out, if the river into which it dips afford a due supply of water. If it be objected that the river may possibly become dry, we answer that it is not uncommon on the Continent, to construct water-mills in boats, which are moored in rivers that are never dry. The steam-engine will continue in motion so long as a due supply of steam is kept up; and electro-magnetism gives instances of rotations which may be made perpetual, by means of permanent galvanic batteries.

But the projector of "perpetual motion" will not apply that term to these instances; for, according to him, perpetual motion can only be produced by a machine which, being set in motion, shall go on till worn out, without any power (such as wind, water, steam, galvanic agency, &c.) being employed to keep it in motion.

Now we ask whether any man in his senses, or one in the possession of the slightest knowledge of mechanical science, could, for a moment, think of taking any means towards the attainment of such an object? If he arrange levers, cords, and pulleys in a peculiar way, or do not arrange them at all, how can he expect motion to result without the continued application of a moving power? He may as well bid the carriage proceed without the tractive force of the horse, the steam-engine to work without steam, the ship to sail without wind, tide, or paddles, or the water-mill to grind corn when it dips into a tranquil lake.

If our definition of perpetual motion be correct, we would ask what is it that first sets the machine in motion? This must be a force of some kind; but all our experience tells us, that a force is also necessary to *keep* it going when motion has commenced. However strongly a boy spins his top, it will soon cease to rotate. If our watch be set going, the attempt of the spring to uncoil itself is a constant source of motion; and, after a certain number of hours, that motion ceases, and can only be renewed by winding up the watch again. If a watch were a machine capable of exhibiting perpetual motion, all that would be necessary would be, to put the works together, and then leave them to move spontaneously as long as the materials of the watch lasted. The being who could do this would be superhuman, for his machine would furnish of itself the power by which it works. Art supplies us with no such instances whatever; and if we seek for instances at all, we must look to science: but if we go even to the sublimest of all sciences, Astronomy, it will not avail us in such a search; the planets move round the sun in beautiful regularity, but it required the will and the power of the Creator to set them in motion.

When we descend from the mechanism of the heavens to the rude machines made by man, we find ourselves still more removed from the object of our search. The purpose of every machine is either to increase power or to change its direction. Man may make the steam-engine pump up water; here steam is the force and the moving power, but man will never be able to construct an engine which shall pump up sufficient water to keep itself at work. The question how such a machine, the very object of which is ridiculous in its enunciation, may be constructed, has occupied the thoughts and the fortunes of many men, and may still continue to occupy both, until projectors see the necessity of studying mechanical science, before they think it possible to attain to that skill which really exists only in the Creator. Science confers a double boon upon man; it increases his power, and it teaches him that that power has a limit, by which he is restrained from seeking after impossibilities.

The alchemist who sought to convert the baser metals into gold, was a less culpable projector than he who seeks the perpetual motion. The former proceeded on the mistaken assumption, that all the metals consisted really of gold and silver, but that certain impurities, combined with the noble metals, gave each of the baser metals its distinctive character. Thus, lead was supposed to consist of gold and a certain impurity, which two constituted lead, and, consequently, if the impurity could be removed, gold would remain, and so on with the other metals. The alchemists were in general men who had studied all the chemical knowledge, or what passed for knowledge, of their age; but the projector of "perpetual motion" is, we believe, always an ignorant enthusiast, who has not studied the commonest principles of mechanical philosophy, or, if he have passed through this purifying ordeal, he comes out unpurified, for he disbelieves those principles which would, if understood, prevent him from pursuing such futile researches.

Our distinguished countryman, Dr. Thomas Young, says, that—

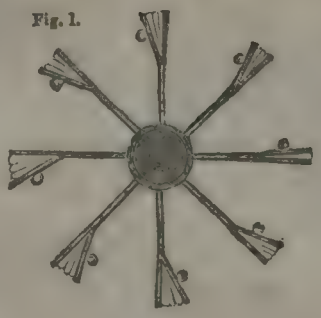
> To seek for a source of motion in the construction of a machine, betrays a gross ignorance of the principles on which all machines operate. The only interest that we can take in the projects which have been tried for procuring a perpetual motion, must arise from the opportunity that they afford us to observe the weakness of human reason; to see a man spending whole years in the pursuit of an object, which a week's application to sober philosophy might have convinced him was unattainable.

It will be amusing to adduce a few examples of this "gross ignorance," in some out of the numerous attempts which have been made to obtain perpetual motion.

Many machines have been constructed on the supposition that any number of weights ascending by a certain path, one side of the centre of motion, and descending on the other side at a greater distance from the same centre, must cause a constant preponderance on the side of the descent. For this

purpose the weights have been fixed on hinges, (as in fig. 1, where the small balls represent the weights attached to hinges,) which allow them to fall over at a certain point, and so, by a peculiar contrivance not shown in the figure, are made to become more distant from the centre of motion. This disposition of the weights is shown in fig. 2, where the balls A B C are farthest removed from the centre of motion. Now, if we look at the number of balls on each side of the middle vertical line, we shall see that there are more on one side than on the other; and it was supposed that the force of gravity would tend to depress that side on which the greater number of balls were situated, and thus to produce motion. In another instance, the weights were made to roll along grooves or ledges,

Fig. 1.



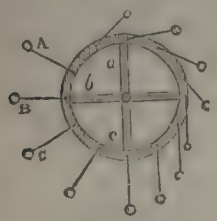


Fig. 2.

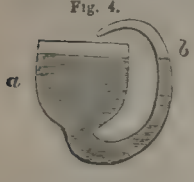
Fig. 3.

as in fig 3; (a ball being in each division, and prevented from falling out by a disc of glass covering the wheel,) so that the balls are, in succession, during the descent, driven nearer to the rim of the wheel.

But all such contrivances are built upon a fallacy. Although the number of weights on one side of either of the above wheels may be larger than that on the other side, yet they are proportionally nearer to the axis; so that what they gain in number, they lose in exactly the same amount in leverage, or moving power. One of the above fallacious machines was made the subject of a patent.

Another projector thought to obtain perpetual motion, by constructing a goblet of the form shown in fig. 4. This goblet gradually diminished in size towards the bottom, until it became a tube, which was turned up, so as to point into the mouth of the vessel. He imagined that a pound or more of water in *a*, must more than counterbalance an ounce of water contained in the tube *b*; and must, therefore, be constantly pushing that ounce forward into the vessel again; so that there would be a constant stream circulating through the vessel and tube. When he made the trial, he found, to his dismay, that the liquid rose to the same height in the tube as it stood in the goblet, by virtue of the well-known law, that liquids tend to a constant level.

Fig. 4.



The "perpetual motion" was advertised some years ago as being exhibited in London. The advertisements were well written, and had an air of scientific authority about them, which imposed on the credulous. "The scientific world, and an enlightened public, are respectfully invited to come and pronounce as they find; for in this extraordinary combination of simple agents, the motion could not be diminished by any resisting power; and the desideratum for which the mechanical world had so long languished, is now patent to all at a shilling a-head.—Children and servants half-price."

Crowds of the "enlightened public" went to see this wonder, thus so liberally and so cheaply thrown open. In the midst of a large room, there was an octagonal frame supported on legs, about three feet from the floor. Within the frame-work appeared several, slender, metallic rods, radiating from a point, and descending at an angle of about 40°, till they terminated in small, flat projections, attached to a circle which was enclosed within a glass case. The whole being suspended, or balanced on an upright centre, moved slowly round, the motion seeming to originate in, and to be perpetuated by, itself.

This exhibition was one of the London lions for a few weeks. But a scientific man, examining the apparatus somewhat narrowly, observed certain minute apertures within the exterior case, and satisfied himself that streams of air were admitted thereby, so as to strike against the projections at the bottom of the rods, and thus keep the machine in steady motion. The publication of this explanation *stopped* the perpetual motion immediately, but not before the projector had gleaned a rich harvest.

A similar exhibition was got up in Edinburgh some years ago, by a Scottish shoemaker; and, more successful than the London exhibition, it is said to have imposed upon several scientific men. The motion was said to be due to an "alternation of magnetic influences, by means of an interposed substance, which neutralized them in turns." In this substance, which the inventor pretended to have discovered, lay the whole secret. But it happened that some accident discovered a suspended weight in an adjoining room, which communicated with the perpetual motion apparatus by a cord that passed under the floor, and up through the leg of the table on which the apparatus stood. This weight was wound up every night except Saturdays, the wife of the impostor insisting that, perpetual or not, the motion should have a respect for the fourth commandment.

We may conclude this short article, by advising any ingenious person who may fancy that he has discovered the "perpetual motion," or any machine endowed with new powers, to pause deliberately before he endeavours to realize the creations of his imagination. Let him read those scientific books which are connected with his subject, with the determination to know, and to profit by, the labours of those who have preceded him, and not to proceed with his project if he find either that it is impossible, according to the rules of science, or that it has been discovered before. Had patentees always grounded their invention on scientific principles, much misery, and many a sickened heart from "hope deferred," would have been spared, for mechanical discoveries are rarely made by those who are ignorant of science. A man may find a sum of money by accident, but the reader may be assured that accident never discovers a new machine or a new principle, unless the mind be previously prepared by study to receive it.

A few years ago, a person fond of mechanical pursuits, submitted to the writer a plan for a machine, whose object was to supersede steam in all those cases where the steam-engine is now employed. Water was to be the moving power, and the principle was somewhat similar to that of the hydrostatic press. The writer advised the projector to study the subject well, by referring to such works as treated of hydrostatical machines, before he embarked his capital in the project. This, however, he refused to

do, stating that he should read no such books, because his invention, being quite new, could not be affected by any thing that had been written on the subject. Upon this resolution he acted,—contrived such arrangements of machinery as had either been discovered before, or had been proved to be fallacious, and spent much money, without the smallest prospect of a proportionate return for it. We fear that such instances are far from rare.

AN AMERICAN'S OPINION OF THE

WEALTH AND POWER OF GREAT BRITAIN.

As in approaching a great and wealthy city, every thing conspires to excite high expectations, long before you get a glimpse of its tall steeples and magnificent buildings; so you cannot approach the island of Great Britain, from any quarter, without perceiving, while yet its cliffs are below the horizon, that you are drawing near to a great commercial country. If it is the Irish Channel which you enter, you find it covered with coasters, and steam-vessels, and stately merchantmen and splendid packets. Is it the harbour of Plymouth or of Portsmouth for which you steer, it is whitened, in like manner, with a busy and prosperous commerce; and proudly bears upon its bosom many a gallant ship of the Royal Navy. Or do you bear away for the English Channel, the waters are everywhere instinct with commercial enterprise, and laden with its richest products. And as you sweep round the island, and enter the Thames, and are borne onward by the rising tide, towards the great emporium of the world, you are astonished to see what fleets of merchantmen are arriving and departing; and still more, when, for many miles below London, you are obliged to thread your way through dense forests of masts, from the tall "Norwegian pine," down to the slender spars of the humble fishing smack. Such are the thousand demonstrations of the wealth and power of Britain which strike you, even before you set your foot upon her shores; and as you make the tour of the island, it is impossible not to feel that she is the richest country on the globe.

Let me suppose then, that you take one of the packets for Liverpool. You will, of course, when you arrive there, embrace the earliest opportunity to see what is most worthy of a stranger's attention in that prosperous town. You will look at the public buildings—at the long ranges of lofty warehouses—at the immense piles of cotton and other commodities, just discharged upon the quays; and, above all, at the docks themselves, ample enough almost for a great navy to ride in, and crowded with merchantmen and packets, as if the trade of a kingdom was concentred there: all these you will pass in rapid review, and they will, I may venture to predict, give you a higher idea of the wealth of the place, and the extent of its trade, than any description has ever conveyed to your mind. And then, too, the quantities of goods daily arriving by the Liverpool and Manchester rail-road, for shipment to the United States and other foreign markets, will vastly exceed all your previous conceptions.

Is Manchester your next stopping place? See how many thousand bales of cotton are transported to that vast market in a single day, to be consumed, almost as soon as they reach the mills; pass through some of the largest factories—look into the warehouses, many stories high, and near a furlong in length—think what cargoes of crates, bales, and packages are put up and sent off every week, and what millions of pounds have been invested in buildings and all kinds of machinery; then pass on, if you choose, to Leeds, from Leeds to Sheffield, from thence to Birmingham, and so on, from one manufacturing town to another, diligently making your observations and inquiries, and it will be strange, indeed, if you do not say, "the half was not told you."

Nor, if you would form any just estimate of the enormous wealth and resources of England, must you fail to notice what a vast amount of business is done upon the numerous canals and great roads of the kingdom. You must look, also, at the crops and pasturage, and flocks and herds, such as the world can nowhere exhibit, on an equal extent of territory; and when you have done all this, and glanced at the proud castles and wide domains of the nobility, and thought of their princely incomes, and looked into the depots, and arsenals, and dockyards of the kingdom, conceive, if you can, what must be the aggregate wealth, and what the power of such a country.

But I have not yet spoken of the metropolis the heart of this mighty empire, whose beat fills every great artery, and sends life and health to all the extremities of the body politic. You must see London, or all your conceptions of the riches and greatness of the empire will be extremely inadequate. London! its palaces, its churches, its Post-office, its Custom-house, its Exchange, its *Bank of England*, its wilderness of costly and magnificent edifices, both public and private; its bridges, its warehouses, its docks, its commerce, its merchandise, its liveries, its nobles, its bankers, its thousands of high-minded and wealthy merchants; but I forbear. There have been more populous cities in the world than London; but she is incomparably richer than any other, whether ancient or modern. It would scarcely be extravagant to say, that she possesses the means of buying out half a score of the largest capitals of Europe, at a fair valuation. Who will deny that London is, at this moment, the great banking-house of the world, and is able seriously to affect every moneyed system of every nation under heaven, almost at pleasure!

What was it but British gold, that enabled Spain and Germany, and other continental powers, to meet the shock of the French Revolution; to keep such vast armies in the field; to maintain the struggle with the greatest conqueror of modern times, for almost twenty years, till the whirlwind of the last battle swept him away, and a rock in the wide ocean received him to its safe and final custody? What other nation was ever able to build and keep in commission a *thousand ships* of war, like those which rode triumphant in every sea, and I may say, blockaded the whole continent of Europe for ten years?

It appears from authentic sources, that during the French Revolutionary War, which broke out in 1793, and lasted till 1802, Great Britain expended 464 millions of pounds. The war against Bounaparte began in 1803, and ended in 1815. During those twelve years of extravagance and carnage, she spent the enormous sum of 1159 millions!!—771 millions of which were raised by taxes. Yes, *seven hundred, seventy-one millions of pounds*, or about 3759 *millions of dollars*, were paid into the treasury, by the people, in twelve years!—that is to say about 312,000,000 of dollars annually, or more than 800,000 dollars per day!! Thus the expenditure of Great Britain in these wars during 20 years amounted to 1623 millions of pounds, or 8000 millions of dollars. Was there ever any other nation since the world began, that could have raised one-third part of the sum without utter bankruptcy and ruin? Now, be it remembered, that nine-

tenths of this incredible sum was as much lost to the nation as if it had been thrown into the Atlantic; and yet there is no counting her remaining treasures. It is true her national debt is enormous, between *eight and nine hundred millions* of pounds, under the weight of which it has often been predicted she must one day sink to rise no more. But to whom does she owe this debt? To France? to Russia? to the United States?—No; but to *herself*; that is, to her own people. Not a dollar of it is due to any foreign nation—so that if the British government were to declare itself bankrupt to-morrow, the *nation* would still be just as rich as it is now. It would be an act of extreme injustice to all the fundholders, to be sure, and would ruin thousands of families; but the money would all remain in the country—and Britain would continue to be, as she is, by far the richest nation in the world.

But how is this to be accounted for? She was once poor, and how has she accumulated such enormous treasures? How is it, that after throwing away money enough, in foreign wars, to enrich a great empire, she has still enough left to buy out twenty kingdoms? In answering these questions, I shall be led to glance rapidly, as I proposed, at *her natural resources, her agriculture, her manufactures, and her commerce.* And,

First, *what are the natural resources of the island of Great Britain?* Who, in looking at it, (a mere speck upon the map of the globe,) would suppose there could ever be such an accumulation of wealth and power, as it undeniably contains, on so small a territory? None of its mountains teem with the precious ores, and none of its rivers "roll down their golden sands." It has some liberal veins of copper; but its most valuable minerals are iron, tin, and lead. The single State of Virginia is larger by nearly three millions of acres than the whole of England and Wales, from the "Land's-end to the banks of the Tweed." Missouri, also, is larger by a million of acres; Georgia by more than half a million; and Illinois contains just about the same number of square miles. The climate of Britain is better than that of almost any other country so far north, being greatly modified by the proximity of the Atlantic and German Oceans; but it will not compare with some others, in milder latitudes. In some parts of England the natural soil is deep and rich; in general it is *good;* and it is certainly almost everywhere susceptible of high cultivation. But my belief is that the soil of Kentucky is richer—Illinois is richer; and to say nothing of some of the States further south, I am strongly inclined to the opinion that both New York and Pennsylvania contain more square miles of first-rate land, in proportion to the area, than England and Wales. I speak now of the soil in its virgin state—certainly that of England is under higher cultivation.

So far as great water-power contributes to the wealth and prosperity of a country, Britain enjoys no advantages over other nations. In fact, she has very little, compared with many others that are infinitely inferior to her in capital and enterprise. But she does not need it. She has inexhaustible beds of coal, and these, with the steam-engine, are worth more to her than would be all the water-power of a hundred Genesee or Merrimack rivers. By the aid of steam, she sinks her shafts wherever coal, or any of the valuable ores are found, and brings up the product from the depth of a hundred fathoms. She erects her furnaces and forges on the spot; and whether it be hill or dale, she generates with the greatest ease, all the power she wants, to wield the most ponderous machinery. If it is lime that she wishes to prepare for building, or for manure, she rarely finds it necessary to go far for coal to burn it. Indeed, it is not uncommon to find alternate strata of coal and iron and limestone, all in the same pit; and then you will see all the processes of bringing them up from its dark caverns, manufacturing the iron, and burning the lime, going on at once. Some of the veins are followed by the workmen to the distance of one or two miles, and it was exceedingly interesting to me, to see fine wheat and other crops, waving over extensive fields, while the excavations were going on below, and yielding to the proprietors a hundred times the value of the lands themselves. Before the prodigious power and various applications of steam were discovered, these vast beds of coal were valuable, simply as common fuel; but now there is nothing but what they can accomplish, and they are worth in comparably more to the country, than the mines of Potosi would have been, had they been placed in the mountains of Wales instead of the Andes.—REV. DR. HUMPHREY.

CORONATION ANECDOTES. No. VII.

EDWARD VI.

EDWARD VI. was crowned February 20th, 1546. "He rode through London into Westminster," says Holinshed, "with as great roialtie as might be, the streets being hung, and pageants in divers places erected, to testifie the good willes of the citizens . . . As he passed on the south part of Paule's churchyard, an Argosine came from the battlements of Paule's church upon a cable, being made fast to an anchor by the deane's gate, lieing on his breast, aiding himselfe neither with hand nor foot, and after ascended to the middest of the cable, where he tumbled and plaied manie prettie toies, whereat the king and the nobles had good pastime." Upon this, Holinshed quaintly remarks in the margin, "Paul's steeple laie at anchor." We have already noticed the remarkable changes made in the ceremonial for this prince's coronation by the lord protector, the duke of Somerset.

At this coronation, when the three swords, for the three kingdoms, were brought to be carried before him, the king observed, that there was yet one wanting, and called for the BIBLE. "That," said he, "is the sword of the spirit, and ought in all right to govern us, who use these for the people's safety, by God's appointment. Without that sword we are nothing: we can do nothing. From that we are what we are this day . . . we receive whatsoever it is that we at this present do assume. Under that we ought to live, to fight, to govern the people, and to perform all our affairs. From that alone we obtain all power, virtue, grace, salvation, and whatsoever we have of divine strength." Child as he was, so well had he been trained, and so excellent was his moral and intellectual nature, that he was capable of thus thinking and thus expressing himself. One, who was about his person, says of him, "If ye knew the towardness of that young prince, your hearts would melt to hear him named: . . . the beautifullest creature that liveth under the sun; the wittiest, the most amiable, . . . and the gentlest thing of all the world." "No poor," says Fuller, "passeth by him without praising him, though none praising him to his full deserts."

QUEEN MARY.

Mary, the first female sovereign of this realm, was crowned on the 1st of October, 1553, by Stephen Gardiner, bishop of Winchester, the archbishops of York and Canterbury being then prisoners in the Tower

On the last day of September she went in state from the Tower to Westminster in an open chariot, drawn by six horses, covered with cloth of tissue. Holinshed says of her dress, "she sate in a gowne of purple velvet, furred with powdered ermines, having on hir head a kall of cloth of tinsell, beesett with pearle and stone, and above the same upon hir head, a round circlet of gold beesett so richlie with precious stones that the value thereof was inestimable, the same kall and circle being so massie and ponderous, that she was faine to beare up hir head with hir hand, and the canopie was borne over her chariot." In a second chariot came the Princess Elizabeth, and the Lady Anne of Cleves; the ladies in waiting rode upon horses covered with trappings of crimson velvet and satin. Three pageants were erected in Fenchurch-street by the Genoese, Easterling, and Florentine merchants. That of the Florentines attracted most notice; it was a lofty tower, on the top of which were four pictures, and in the middle the figure of an angel; a trumpeter was concealed within the pageant, and whenever he sounded, the angel appeared to lift the trumpet to its mouth "to the great marvelling of manie ignorant people."

Among the city pageants, the most remarkable was that of St. Paul's cathedral, thus described by Holinshed:—"There was one Peter, a Dutchman, that stood on the weathercock of Paule's steeple, holding a streamer in his hand of five yards long, and waiving thereof, stood sometimes on the one foot and shooke the other, and then kneeled on his knees, to the great marvell of all people. He had made two scaffolds under him, one about the crosse, having torches and streamers set on it, and another over the ball of the crosse, likewise set with streamers and torches, which could not burn, the wind was so great."

The conduits ran with wine, and when the civic authorities received the queen at Cheape, the chamberlain presented her with a purse of tissue containing a thousand marks in gold.

There were so many exceptions in the general pardon published at this coronation, that it should rather be called an act of attainder; among the persons excepted by name were the archbishops of Canterbury and York, the bishop of London, and the two chief justices of England, Sir Edward Montacute and Sir Roger Cholmondelie, with several barons, knights, and gentlemen of the law who had advocated the title of Lady Jane Gray.

Elizabeth.

For many interesting anecdotes connected with the coronation of this celebrated queen, the reader is referred to the series of papers on her Progresses and Public Processions.

James I.

The ceremonial for the coronation of James I. was prepared under the superintendence of that monarch, and displays many marks of the pedantry and extravagant notions of the royal prerogative, which forms so large a portion of his character. His previous distribution of honours was more lavish than usual; he created two earls, ten barons, sixty-two knights of the Bath, and conferred the honour of knighthood on about four hundred gentlemen. His coronation was celebrated July 25, 1603, the ceremonies of crowning and anointing being performed by John Whitgift, archbishop of Canterbury. There was no procession from the Tower to Westminster, in consequence of the plague which then raged in London; and for the same reason a proclamation was issued, forbidding all persons except the lord mayor, aldermen, and twelve principal citizens of London, to attend the ceremony, for fear of spreading the infection.

An anonymous writer in the reign of Charles I., insinuates that advantage was taken of the thin attendance on this occasion to introduce some novelties into the form derogatory to the rights of the English people, and even hints that the plague was a mere pretext to keep away those who might have exposed the alterations. But this appears very improbable, because the pestilence was so alarming that the king and court removed to Winchester the morning after the coronation.

Charles I.

The coronation of Charles I. was delayed until the 5th of February, 1626, in consequence of the plague, which then reigned in London. Previous to the ceremony a commission was issued to Archbishop Abbot, and some other prelates, of whom Laud was the principal, empowering them to make such alterations in the ritual as might render it more in accordance with the rules of the Church of England. This circumstance induced the puritans subsequently to charge Laud with the alterations which had been really made in the time of James I. The principal novelty was the introduction of the following clause in one of the prayers: "Let him obtain favour for thy people, like Aaron in the tabernacle, Elisha in the waters, Zacharias in the temple. Give him Peter's key of discipline and Paul's doctrine." This had been omitted by the Roman Catholics since the reign of Henry, because it seemed to intimate that English kings possessed more ecclesiastical jurisdiction than the popes allowed, and for the same reason its revival was offensive to the puritans. Some superstitious people regarded it as an evil omen that the king on this occasion wore a white dress, contrary to the custom of his predecessors, who generally used purple robes.

In the year 1633, Charles went to be crowned king of Scotland at Edinburgh. He was received with great splendour, and several pageants were prepared to honour his reception. The most singular was a triumphal arch, under which a mountain was raised in the form of a theatre, upon which sat a nymph, representing the Genius of the city of Edinburgh. "Shee was attired in a sea-greene velvet mantle, her sleeves and under roabe of blew tissue, with blew buskins on her feete, about her necke shee wore a chaine of diamonds, the dressing of her head represented a castle with turrets, her locks dangled upon her shoulders." She was attended by Religion, "all in white taffeta, with a blew mantle seeded with starres, and a crowne of stones on her head, to shew from whence she is," leaning upon a shield, and trampling beneath her feet Superstition, represented as a blind old woman, covered with rags. On the left hand stood Justice, in "a red damaske mantle," trampling upon Oppression, represented as "a person of fierce aspecte, in armes, but broken all and scattered."

When the king drew near, the mountain appeared to move, and the nymph addressed a long speech to the king, of which it will be sufficient to quote the first sentence: "Sir, If Nature could suffer rocks to move, and abandon their natural places, this town, founded on the strength of rocks, (now by all cheering rays of your majesty's presence taking not only motion but life,) had with her castle, temples, and houses moved towards you, and besought you to acknowledge her yours."

On Tuesday, June 18th, the king was crowned by Spotswood, archbishop of St. Andrews.

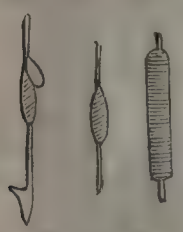
FACTS IN COMPARATIVE ANATOMY.

No. IV.

THE ORGANS OF DIGESTION IN THE CATERPILLAR, GRUB, AND BUTTERFLY.

IT is impossible to bring under our observation the most apparently insignificant work of the creation, without being struck, not only with the evidence of design and with the liberality with which every creature is supplied with all that is necessary to its welfare in the state of life in which it moves, but also with the singular combination of economy with profusion which marks all the works of the Creator. It would seem as if a certain portion of material was destined to each individual, and afterwards extended so as to be of the greatest advantage to the creature. We have many very striking instances of this in the construction of the digestive organs of animals, those of the vegetable feeders being much more voluminous than those of the carnivorous tribes. The intestines of the sheep are, at least, six times the length of its body, while those of a lion or tiger do not exceed three times. The reason is, that vegetable food is less easy of digestion than animal, and requires a more complicated apparatus; and we find the same arrangement prevailing among the insect tribes.

Fig. 3. Fig. 2. Fig. 1.



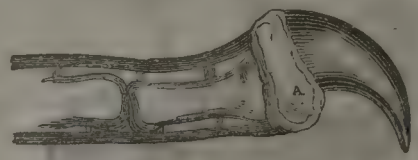
The spiral portion of fig. 1, shows the size and extent of the digestive canal in the caterpillar, nearly filling the cavity of the body. It is well known that a caterpillar is exceedingly voracious, and this extent of stomach enables the creature to digest or assimilate the great quantity of food which it devours. When after successive changes of its skin the creature has attained its full growth, it is changed into the pupa, or chrysalis, state, and having ceased to eat, the stomach shrinks up and becomes of the size and form shown in fig. 2. Soon after, emerging from its shroud, the little creature becomes a butterfly or moth, and if we now examine its stomach, fig. 3, what do we see?—the spiral portion remains as in fig. 2, but at the upper part of it a small bag is found, called the honey-stomach. Now the butterfly partakes of no solid food, and therefore, like the chrysalis, requires no proper stomach, but it does not entirely pass its life without partaking of the food with which it is surrounded; it sucks the juices of plants by means of its tubular tongue, and this honey-stomach is placed there to receive them.

So, again, if we look to the frog; while in the tadpole state, it feeds voraciously on vegetable substances, and has very long intestines; but as soon as it becomes a perfect frog, it leaps about in search of flies and other small creatures, and its intestines are suddenly shortened to one-third of their original length.

POWERS OF DEFENCE AND OFFENCE POSSESSED BY ANIMALS.

A CONTINUAL war seems to be going on among the inferior creatures of the animal kingdom, the stronger preying upon the weak, the sluggish submitting to the power of the swift, and those with obtuse instincts to others possessed of more cunning. But t being a great object of nature to continue the succession of the species which it has pleased the Almighty to create, means are provided to counteract the destructive power possessed by the more powerful animals. We accordingly find that the larger and more destructive kinds produce but few young at a birth, while the smaller and more inoffensive are extremely prolific; at the same time, each is provided with such powers of defence as are necessary for its well being. We have already seen how the teeth are adapted to the kind of food on which their possessor subsists, and we shall find that the means of procuring this food have been equally bestowed.

Beginning with the most destructive tribes, as lions, tigers, &c., we find them possessed of great swiftness of foot; without this power they would be unable to overtake the animals on which they chiefly subsist, such as antelopes, and the smaller species of the deer kind, which abound, in almost incredible numbers, in the regions of the torrid zone. Their chief weapons of attack are their powerful and well-armed fore-legs. With the large and apparently disproportioned paw of the lion, the creature can with ease disable its victim by a well-aimed blow, while the strong, sharp, and hooked claws with which it is furnished, assist in tearing it to pieces. The claw of the lion, and of all the cat-tribe, so necessary to the animal, is most admirable both in its construction, and in the means provided for its preservation from injury. The hinder part of the under side of the



claw itself is fixed, as it were, on a hinge to the bone of the toe, at A; a short muscle is attached to the back part, by which the claw can be drawn back at pleasure into a cavity prepared for its reception. Of this we have a familiar illustration in the foot of a cat, which, when the creature is pleased, is as smooth as velvet, but when alarmed or angry, the sharp claws are thrust out.

The tribes of animals that feed on vegetables, from the nature of their food, require no offensive weapons to obtain it; but nature has still provided them with the means of defence against the carnivorous tribes; the principal mean by which they foil their enemies being swiftness of foot. Deer, antelopes, hares, and rabbits are all famed for their fleetness. The larger tribes of vegetable feeders, as the elephant, the rhinoceros, the horse, the stag, &c. are all provided with powerful weapons of defence. The strength of the e phant and its formidable trunk constitute its weapons; the rhinoceros has its terrific horn, the horse its hoofs, and the stag its antlers. The smaller kinds of animals, whose physical powers are insufficient for their defence, escape their enemies by cunning and concealment, chiefly by burrowing in the earth.

MAN is an animal formidable both from his passions and his reason; his passions often urging him to great evils, and his reason furnishing means to achieve them. To turn this animal and make him amenable to order, to arouse him to a sense of justice and virtue, to withhold him from ill courses by fear, and encourage him in his duty by hopes; in short, to fashion and model him for society hath been the aim of civil and religious institutions, and in all times the endeavour of good and wise men. The aptest method for attaining this end hath been always judged a *proper education*.—BISHOP BERKELEY.

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THE TOWN OF KILMALLOCK, IN IRELAND.

KILMALLOCK, COUNTY OF LIMERICK.

That town most faire, that long a building was,
Where now, God wot, there grows nothing but grasse
The stones lye waste, the walles seeme but a shell
Of little worth, where once a prince might dwell.

KILMALLOCK is an ancient town in Ireland, situated sixteen miles from Limerick, on the road leading to Cork. It is principally remarkable for the extraordinary contrast between its former greatness and its present fallen condition; on account of which it has been styled the "Balbeck of Ireland." Archdale, speaking of it, says, "Kilmallock was formerly a town of great note, being walled, and the houses beautifully and elegantly built of hewn stone; it is now in ruins, yet has a greater share of magnificence even in that miserable state than any town in Ireland." Sir Richard Colt Hoare, who says that it is "an object highly worthy of the attention both of the artist and the antiquary," thus describes its general appearance.

The first view of this place is singularly striking; it has the appearance of a town suddenly deserted and left in ruins. I entered it by the side of a lofty turreted gateway, leading into the principal street, which is formed on each side by a line of houses, excellently well built of stone; a certain uniformity prevails in the style of architecture, and in a great measure ascertains their date. Many of these houses have been perfectly gutted, and have only the outward shell of wall remaining. This town was fortified with a strong wall, and (as I was informed,) had five gates, of which two only now remain; the one on the road to Limerick, called St. John's Gate, the other leading towards Charleville.

According to others there were originally but four gateways; the two which remain are built in a massive style, and have a solid heavy effect, "with a strong resemblance to Spanish or Moorish architecture." The Limerick gate looks towards the north, and the Charleville gate towards the west. A portion of the town-wall, still retaining in some places its original height, may be traced uninterruptedly from the one gate to the other; it is supposed to form a fourth part of the whole rampart.

It is the main street, however, which conveys the best idea of the ancient consequence of Kilmallock, and likewise, it may be added, of its present degradation. On each side are the remains of houses built of hewn stone, and apparently on an uniform plan; the workmanship is so excellent, that the walls of many of them are still in perfect preservation, only roofs and floors being wanted to make them as complete as when formerly inhabited. These houses are

three stories high, and are ornamented on the outside with an embattlement and a tasteful stone moulding. The square window-frames and large fire-places are well carved in a bold and massive style; and such is the durability of the limestone, though exposed to the weather and casual injuries, that "it retains the sharpness of the chisel, as if only yesterday from the hands of the sculptor." The contrast between these stately relics of former days, and the mean cabins which shelter the present inhabitants, is very striking, and calculated to produce rather a mournful impression on the mind. Instead of attention being paid to the preservation of these remains, they are continually being destroyed; for it is the practice whenever a hovel is to be built, to procure the materials by breaking down a part of them. Moreover, some of these once-splendid mansions have been lowered, and fitted up "in accordance with the neglect and desertion of the place," while the interior of others has been occupied by "sheds for cattle, or more loathsome pigsties."

Mr. Crofton Croker, in his remarks upon "Travelling" in Ireland, gives an amusing account of the accommodation which he obtained at Kilmallock; it serves to illustrate the condition of that place, and affords an example of the system which prevails in the inferior towns and villages, where "the charges are extravagant in an inverse proportion to the indifference of the accommodation, and generally exceed those of the first hotels in the metropolis."

Our bill (he says,) at Kilmallock was anything but moderate, and yet the house, though the best the town afforded, appeared to be one where carmen were oftener lodged than gentry. The landlady stood at the door, and with a low curtsey and a good-humoured smile, welcomed us to the 'ancient city of Kilmallock;' in the same breath informed us that she was a gentlewoman born and bred, and that she had a son, 'as fine an officer as ever you could set eyes on in a day's walk, who was a *patriarch* (a patriot) in South America;' then leading us up a dark and narrow staircase to the apartment we were to occupy, wished to know our names and business, whence we came, and where we were going, but left the room on our inquiring, in the first place, what we could have to eat. After waiting a reasonable time, our demands were attended to by a barefooted female, who, to our anxiety respecting what we could have for supper, replied with perfect confidence, 'Just anything you like, sure.' 'Have you anything in the house?' 'And indeed we have not, but it's likely I might be able to get an egg for ye.'

Close to the town, on its eastern side, runs a small stream, called the Cummogue, which falls into the river Maig. On each bank of this stream are the remains of an ancient abbey. That which stands on the same side as the town, and was comprised within the ancient precinct of its walls, is for the most part in ruins, but the chancel has been fitted up and used as a church. The abbey is said to have been founded by St. Mocheallog, who died between the years 639 and 656. The front, according to Sir Richard Colt Hoare, "is rendered picturesque" by a round tower annexed to it, seemingly of a much older date than the rest of the building; and that gentleman is inclined to think that the tower belonged to a chapel, or oratory, existing on the spot prior to the foundation of the abbey. The architecture is of the pointed order, and both the materials and the workmanship are good. Several monuments are to be seen, which were erected in memory of members of neighbouring families during the seventeenth century, "and it is difficult," says Mr. Crofton Croker, "to imagine more barbarous or grotesque pieces of sculpture than some of them exhibit." This want of skill in the execution of works, on which much labour has evidently been bestowed, is rather surprising in a town possessing so many conspicuous specimens of beautiful masonry of the same date.

The ruined abbey on the opposite side of the stream is of greater extent than the one just described, but "has too lonely and stern an appearance to be picturesque, circumstances which render it sublime." It is a solid yet graceful structure, in the pointed style; it "surpasses in decoration and good sculpture," says Sir Richard Colt Hoare, "any I have yet seen in Ireland, but does not appear to be older than the reign of king Edward the Third." The eastern, or great altar window, is described as a fine specimen of the chaste lightness of the pure Gothic style. Facing this window, in the centre of the chancel, stands the family tomb of the White Knight, a title assumed by a branch of the Fitzgeralds, or, as they are often called, the Geraldines, and derived, according to Camden, from the gray hairs of the founder of that line.

In the pedigree of the Fitzgerald family (says Mr. Croker,) the titles of some of the branches settled in the south of Ireland are so romantic, that they carry us completely back to the days of chivalry, as we find besides the White Knight, the Knight of Glen, sometimes called the Knight of the Valley, the Black Knight, and the Knight of Kerry, appellations that continue to be bestowed on the lineal representative at the present day.

When this gentleman saw it, the ponderous slab which covered the White Knight's tomb was broken in two parts, one of which, lying overturned beside it, bore a Latin inscription, recording the fact of its having been erected "to the membry of that branch of the Geraldines who are commonly called White Knights," and of its being the tomb of many of that family. While Mr. Croker was examining the mutilated tomb, a barefooted boy, leading some cattle which had taken shelter from the noontide heat in the shade of the abbey walls, introduced himself with the exclamation "May the curse of Cromwell be on the White Knight!—He was the cruel and bad man, sir!" and added, "they say 'twas the black bull that tattered it in this way, your honour; but 'tis my belief it was none of his doing, but the work of some kind of evil spirit or other. It was just broken and left as it is now four nights ago, and in my opinion 'tis a judgment on the White Knight, for he was the cruel and bad man!"

Within the ruins of this abbey at Kilmallock are said to have occurred two lamentable instances of the dread of the typhus fever, which raged in the south of Ireland in 1817. They are related by Mr. Trotter, in the following account, of which Mr. Crofton Croker says, that from inquiries made on the spot, he was sorry to find it fully confirmed.

In one part of the ruins, where a fine arched side-aisle was still very perfect, my guide showed some terror; I soon learned from him the cause. A person ill of fever had been left there the day before, lest he should communicate the infection to the family where he lodged.—He was left to expire! His hollow voice plaintively implored some drink; I assured him he should have it, and be taken care of, and hope revived at the moment life was ebbing fast away. In another part of this monastery, I saw a hat of a departed victim exposed some time ago, and at our inn I heard the following story. An American gentleman, totally a stranger, well clad, and of pleasing appearance, came a few months ago to Kilmallock. He went to no inn, but wandered about the ruins till at last entering them he was observed no more, and, perhaps, forgotten! He was ill, and fever burned in his veins; but where can a pennyless and forlorn wanderer turn in a country where he is without friends or money? It happened a gentleman was ill at the inn, and required the attendance of a person to sit up every night. The innkeeper's son performed this humane office frequently, and very early one morning, as the stars were fading at the approach of twilight, he walked out to the

monastery to refresh himself with the morning air, he heard a murmuring noise, as of some human being. It was two or three days after the American gentleman's disappearance. He recollected this and advanced;—but can I go on?—Extended on his back, in a recess of a ruined aisle, the unfortunate stranger lay speechless and expiring! one hand clenched the mouldering wall, the other his hat. The young man, terrified and shocked, ran for assistance. On his return this victim of misfortune was no more! Fever had arrested his steps.

The historian and antiquary, observes Sir Richard Colt Hoare, have cause to regret that so little certain information can be gained respecting the foundation of this ancient town. A charter was granted to Kilmallock by King Edward the Sixth, and another in 1584 by Queen Elizabeth. The latter bestowed upon the inhabitants some valuable privileges, on account of their good services against that "arch-traitor," Gerald, the sixteenth Earl of Desmond, in whose rebellion the town had been more than once plundered and set on fire. In 1598, after the death of the Earl, it was invested by his nephew, the *Sugaun*, or Straw Earl, as he was called, but was relieved by the Earl of Ormond. During the rebellion which broke out in 1641, or "the troubles," to use the popular phrase, Kilmallock was seized by the Irish under Lord Mountgarrett; and in May, 1643, it was besieged by Lord Inchiquin with a force of 700 men. It was afterwards dismantled, and subjected to much injury by Cromwell's army, and since that period Kilmallock seems to have been gradually sinking into decay.

In the year 1572, after Munster had been desolated by the Earl of Desmond and his lieutenant James Fitz-Maurice, Sir John Perrot was sent over from England, as Lord President of Munster, to reduce the province. He landed at Waterford on the 1st of March; and within three days of his landing, the rebel Fitz-Maurice burned the town of Kilmallock, hanged its sovereign, and others of the townsmen, (as many as he could take,) at the High Cross in the market-place, and carried all the plate and wealth of the town with him. Upon which Sir John Perrot, having hastened to Dublin to take his oath of the Lord Deputy, Sir Henry Sydney, returned with all possible despatch, and as many forces as he could collect, to Kilmallock, the late wasted town, where he lodged himself in a house half burned, and issued a proclamation, "That as many of the townsmen as fled, and were living after the said slaughter, should return home; which they did accordingly, and began to build their gates, to repair the town walls, and to re-edify their houses."

Much interest attaches to Kilmallock from its connexion with the "melancholy picture" of the fate of the Desmond family. Their possessions, in the hands of the sixteenth and last earl, Gerald, had grown to an amount unexampled in the history of private property in Ireland; they extended upwards of one hundred and fifty miles through the counties of Waterford, Cork, Kerry and Limerick, and comprised more than five hundred and seventy thousand acres according to the estimate of the period. From the hands of this powerful individual they passed by forfeiture to the crown. The history of Gerald is told with much affecting simplicity in Baker's chronicle:—

Desmond possessed whole counties together with the county palatine of Kerry, and had of his own name and race at least five hundred gentlemen at his command, all of whom, and his own life also, he lost within the space of three years, very few of the house being left alive.

The earl with his followers appeared on the Ballyhoura mountain, in Cork, as the enemy of Queen Elizabeth, and proceeded to attack Youghall, which he captured. Some Spanish troops had been landed in July, 1578, to aid the Catholic cause, Pope Gregory the Thirteenth having offered the country to King Philip of Spain; and with these forces Desmond had garrisoned some of his castles. This rebellion caused a desolating warfare, by which the Earl of Desmond was reduced to so low a state, that he, his countess, and the Papal Legate, escaped with their lives only from the royal troops.

Pursued from one retreat to another, he was forced after several narrow escapes "to keep his Christmas, (1582,) in Kilquegg wood, near Kilmallock." Being attacked here, his followers were all put to the sword, and he and his countess escaped by remaining concealed under a bank of a river up to their chins in water. About the middle of the following year, his chief force, consisting of only sixty gallowglasses, was surprised in the act of boiling horse-flesh, and half of them slain, by a party from Kilmallock.

The last scene of the earl's life is, however, the most tragical. His necessities having compelled him to take some cattle belonging to a poor woman, he was pursued by a few musketeers and kerns in the English pay, who on entering a little grove, in a lonely and mountainous glen, four miles east of Tralee, about midnight, discovered, seated round the fire of a ruinous hovel, four or five of Desmond's known adherents, all of whom fled on their entrance, leaving one venerable and powerless old man; a soldier, named Daniel Kelly, made a blow at him with his sword, and wounded him so severely as almost to dissever his arm; repeating the blow, the old man ejaculated, 'Spare me, spare me, I am the Earl of Desmond!' but the appeal was made in vain; for Kelly struck off his head and conveyed it to the Earl of Ormond, and by whom it was sent over, 'pickled in a pipkin,' to England, where it was spiked on London Bridge; and his body, after eight weeks concealment, obscurely interred in the little chapel of Killanamana, in Kerry.

The account giving by Spenser of the state of Desmond's country, who was a spectator of it, exhibits a dreadful and impressive picture of the calamitous effect of civil warfare. He tells us, that—

Any stony heart would rue the same. Out of every corner of the wood and glynns, they (the people of Munster,) came creeping forth upon their hands, for their legs could not bear them,—they looked like anatomies of death. They spake like ghosts crying out of their graves, they did eat the dead carrions happy when they could find them, yea, and one another soon after, insomuch, as the very carcases they spared not to scrape out of their graves; and if they found a plot of water-cresses or shamrocks, there they flocked as to a feast for the time, yet not able to continue there withal,—that in short space there was none almost left, and a most populous and plentiful country suddenly became void of man and beast.

ILLUSTRATIONS OF THE BIBLE FROM THE MONUMENTS OF ANTIQUITY.

No. XVII.

The Building of the Tabernacle.

The Hebrews, during their bondage, were probably employed by the Egyptians in many mechanical arts besides that of brick-making; for soon after their entrance into the wilderness, we find them constructing a moveable temple, or tabernacle, and displaying in its construction remarkable skill in useful and ornamental manufactures. The knowledge of the higher branches of art was, however, confined to a few; for we read that the sacred historian recorded the names and families of the principal workmen, and with the genuine feelings of every religious mind, attributed their superior excellence to the Author of "every good and perfect gift."

And Moses said unto the children of Israel, See, the Lord hath called by name Bezaleel, the son of Uri, the son of Hur, of the tribe of Judah; And he hath filled him with the spirit of God, in wisdom, in understanding, and in

knowledge, and in all manner of workmanship; And to devise curious works, to work in gold, and in silver, and in brass, And in the cutting of stones, to set them, and in carving of wood, to make any manner of cunning work. And he hath put in his heart that he may teach, both he, and Aholiab, the son of Ahisamach, of the tribe of Dan. Them hath he filled with wisdom of heart, to work all manner of work, of the engraver, and of the cunning workman, and of the embroiderer, in blue, and in purple, in scarlet, and in fine linen, and of the weaver, even of them that do any work, and of those that devise cunning work. (Exod. xxxv. 30—35.)

The superintendents thus named appear to have been men of high rank in their respective tribes, and yet we see that they regarded their appointment as an honour rather than a degradation. In fact, we find that certain arts were practised by the nobles of Egypt, chiefly such arts as afforded scope for the exercise of natural talent, and that none but the lowest mechanical trades were deemed inconsistent with the dignity of high station. This was more particularly the case in the manufacture of articles used in the temples; it was not deemed sufficient to subscribe a portion of superfluous wealth to support the dignity of public worship, it was considered necessary to add manual labour, and to give practical proof that He who created us has a right to the work of our hands. The Egyptians were ostentatious in offering such marks of homage to their false gods; traces of the custom recorded by the historians may be indistinctly recognised on the monuments. The Israelites felt it their duty to exhibit the same devotion to the God of heaven and earth, who had chosen them as his peculiar people, and thus we find princes of tribes labouring at the ornamental work of the tabernacle, and ladies of eminent station shaping and decorating the curtains by which it was surrounded.

Some relics of this interesting custom may be found in various parts of England; the cushion of the pulpits in many country churches is the work of the family of the lord of the manor; and in the ages succeeding the Reformation, the ladies of a parish claimed, as a kind of privilege, the making of the surplice for the clergyman. Such memorials of simple piety may not be quite so beautiful as the work of professional artists, but they are hallowed by a thousand associations more valuable than symmetry or splendour.

The first art recorded as one in which Bezaleel and Aholiab are represented as excelling is that of the engraver. The precious stones set in the priest's ephod and breast-plate were graven with the names, or cognizances, of the twelve tribes, as we have already mentioned; and almost every collection of Egyptian antiquities contains specimens of Egyptian seals and ornaments, which prove that the engraver's art had attained a high degree of perfection even in the earliest ages of the Pharaohs.

Embroidery was in the earliest ages an employment peculiarly appropriated to females, and it appears, at first sight, a little strange, that it should be enumerated among the matters entrusted to the two colleagues. But the word here includes not merely the decoration of textile fabrics, but also the staining and embossing of leather, an ornamental art in which the Egyptians surpassed most nations of antiquity. "Rams' skins dyed red, and badgers' skins," are enumerated among the articles contributed to the furniture of the tabernacle by the congregation, and it seems probable that the tabernacle was lined throughout with this ornamented leather.

The curtains were prepared by the female part of the congregation, and the ladies of rank took the lead in this holy work.

All the women that were wise-hearted did spin with their hands, and brought that which they had spun, both of blue, and of purple, and of scarlet, and of fine linen. And all the women whose heart stirred them up in wisdom spun goats' hair. (Exodus xxxi. 25, 26.)

The spindles represented in the above engraving are similar to those used in various parts of the east, and in the southern provinces of Spain, where many of the customs introduced from the Arabians by the Moors are still retained. In general the spinsters on the monuments appear to be domestic servants, but some of the representations would lead us to believe that spinning factories were established in Egypt. There is, however, little room for doubt, that the ladies of Egypt, like those of Greece in the heroic ages, not only superintended the spinning and weaving in their households, but actually took a part in the work. Their spindles, distaffs, and looms were of the most costly materials and expensive workmanship; hence we find in the *Odyssey*, when Helen displays her treasures before Telemachus, that a golden distaff and work-basket are enumerated among the presents made to the fair queen and her royal consort when they visited Egypt.

A silver canister, divinely wrought,
In her soft hands the beauteous Philo brought;
To Sparta's queen of old the radiant vase
Alcandra gave, a pledge of royal grace:
For Polybus, her lord, whose sovereign sway
Egypt's rich tribes in mighty Thebes obey,—
When to that court Atrides came, carest
With vast munificence the imperial guest.
Two lavers from the richest ore refined,
With silver tripods the kind host assigned;
And bounteous from the royal treasures told,
Ten equal talents of refulgent gold.
Alcandra, consort of his high command,
A golden distaff gave to Helen's hand;
And that rich vase with living sculpture wrought,
Which, heaped with wool, the beauteous Phylo brought;
The silken fleece, impurpled for the loom,
Rivalled the hyacinth in vernal bloom.—*Odyssey IV.*

The circumstance mentioned in the last two lines shows that it was usual to dye in the wool, as is sometimes done in England. The wool spun for the use of the tabernacle was thus previously prepared, and some of the skins also had been coloured before they were offered to the master-workman.

Every man, with whom was found blue, and purple, and scarlet, and fine linen, and goat's hair, and red skins of rams, and badgers' skins, brought them. (Exod. xxxv. 23.)

The various collections of Egyptian antiquities prove that the artists in the age of the Pharaohs had only a few of the principal colours at their command, and that they were not acquainted with the art of modifying them by mixture. The dyers, however, appear to have made this advance, for ancient his-

torians dwell upon the great variety of colours and shades in Egyptian dresses. Still the monuments show us that the colours mentioned by the sacred historian were those most generally used; "blue, purple, and scarlet," are the favourite hangings in the royal palaces and noble halls which the artists have portrayed.

Spinning was regarded as an honourable occupation for the mistress of a household to the latest periods of the Jewish history. Even in the reign of Solomon, when the wealth and luxury of the Jewish nation had attained its greatest height, we find it mentioned as almost an act of duty; it forms a prominent part in the exquisite description given of a virtuous woman in the Book of Proverbs.

She seeketh wool, and flax, and worketh willingly with her hands. She is like the merchant's ships; she bringeth her food from afar. She riseth also while it is yet night, and giveth meat to her household, and a portion to her maidens. She considereth a field, and buyeth it: with the fruit of her hands she planteth a vineyard. She girdeth her loins with strength, and strengtheneth her arms. She perceiveth that her merchandise is good: her candle goeth not out by night. She layeth her hands to the spindle, and her hands hold the distaff. She stretcheth out her hand to the poor; yea, she reacheth forth her hands to the needy. She is not afraid of the snow for her household: for all her household are clothed with scarlet. She maketh herself coverings of tapestry; her clothing is silk and purple. Her husband is known in the gates, when he sitteth among the elders of the land. She maketh fine linen and selleth it; and delivereth girdles unto the merchant. Strength and honour are her clothing; and she shall rejoice in time to come. She openeth her mouth with wisdom: and in her tongue is the law of kindness. She looketh well to the ways of her household, and eateth not the bread of idleness. (Proverbs xxxi. 13—27.)

But as luxury advanced these customs of primitive simplicity gradually fell into disuse, and in the later ages of the Pharaohs we find ladies of rank in Egypt yielding to that indolence which has always formed a part of oriental enjoyment. The labours of the distaff and the loom were neglected; the princess and the lady of rank had no higher enjoyment than to sit in her pleasure-house, enjoying the perfume of the lotus, while a slave attended to fan her and bring a constant supply of fresh flowers. This decline in the simplicity of Egyptian customs was,

however, of much later date than the Exodus. The Hebrew ladies who prepared the curtains and embroidery for the tabernacle, engaged not in work unsuited to their station, for in that age, and to a much later period, the labours of the loom and distaff were regarded as proper employments for the wives and daughters of even the most powerful monarchs.

The Tabernacle was built from the free-will offerings of the people, and it is interesting to find that so far were the Hebrews from exhibiting any reluctance, that the workmen, who were themselves volunteers, had only to complain of too copious a supply.

Then wrought Bezaleel and Aholiab, and every wise-hearted man, in whom the Lord put wisdom and understanding to know how to work all manner of work for the service of the sanctuary, according to all that the Lord had commanded. And Moses called Bezaleel and Aholiab, and every wise-hearted man, in whose heart the Lord had put wisdom, even every one whose heart stirred him up to come unto the work to do it: and they received of Moses all the offering, which the children of Israel had brought for the work of the service of the sanctuary, to make it withal. And they brought yet unto him free offerings every morning. And all the wise men, that wrought all the work of the sanctuary, came every man from his work which they made; and they spake unto Moses, saying, The people bring much more than enough for the service of the work, which the Lord commanded to make. And Moses gave commandment, and they caused it to be proclaimed throughout the camp, saying, Let neither man nor woman make any more work for the offering of the sanctuary. So the people were restrained from bringing. For the stuff they had was sufficient for all the work to make it, and too much. (Exodus xxxvi. 1—7.)

The shape of the Tabernacle cannot be illustrated by the Egyptian monuments; it was a portable temple designed for a wandering race, and the Egyptian religion prohibited everything which was likely to encourage nomadic habits. Indeed, it would seem as if the Tabernacle had been designedly fashioned so as to withdraw the people from all association with the idolatrous worship of Egypt; for Moses was not in this instance permitted to use his own discretion, but received specific directions from Jehovah, not only respecting the general plan of the structure, but even the minutest particulars of its details.

The wood of which it was composed united the two great requisites, lightness and durability; it was probably the same as that of which the mummy-cases are composed, a species of timber which has continued undecayed for nearly thirty centuries, and which every body who has visited a museum of Egyptian antiquities, must know to be about the lightest with which we are acquainted. It was thus easily transported from place to place, especially as the whole tribe of Levi was charged with its custody.

But thou shalt appoint the Levites over the tabernacle of testimony, and over all the vessels thereof, and over all things that belong to it: they shall bear the tabernacle, and all the vessels thereof; and they shall minister unto it, and shall encamp round about the tabernacle. And when the tabernacle setteth forward, the Levites shall take it down: and when the tabernacle is to be pitched, the Levites shall set it up: and the stranger that cometh nigh shall be put to death. (Numbers i. 50, 51.)

We learn from a subsequent passage, that the various parts of the structure and its edifice were assigned to the charge of different families, and from the monuments it would seem that the custody of the sacred things in the Egyptian temples was similarly distributed, for there is no example of priests of one rank using the same utensils as those of another.

COTTAGE GARDENING.

II.

In addressing a few words of advice to our Cottage readers on the economy of Cottage Gardening, we have no intention of speaking on the best modes in which their gardens may be cultivated, or their small plots of land farmed, or the crops most easily raised

or which will prove most profitable: for this most valuable information we would rather refer them to the many excellent and cheap books written for these purposes. The object of the present remarks is to point out the value of that, without which, neither cottage, nor garden, nor field, will prove to its occupier a source either of comfort or advantage.

Let a traveller pass through an agricultural district, he may know little or nothing of the art of farming, and yet if he is at all observant or reflecting, he can hardly fail of giving a pretty correct guess at the comparative excellences of neighbouring farmers. If he is asked why he prefers farm A to farm B, he may not be able to enter into a calculation of the superior excellences of farmer A's stock, or the greater bulk of his ricks, but he will say at once, "I can tell where farmer A's property extends by the superior neatness of his fields, his hedges, and his yards, I cannot therefore doubt that he is the better farmer." There can be no question that the traveller's eye will rest with greater pleasure upon farmer A's fields, but he is not bribed by this satisfaction alone to decide in favour of his superior skill as a farmer. If he reasons at all on what he sees, he will say to himself, "In the farm before me I see instances of care, of industry, of judgment; is it possible for me to observe these without concluding that all these qualifications for the good management of business, are directed and restrained by knowledge?" For after all, how is knowledge of any kind to be attained? Is it not the result of patient labour guided by judgment? Where do we find skill or knowledge sought in this manner, withheld? Every man is liable to make some errors, or fall into some inistakes, and he must smart for them; but if he is wise or judicious, he will speedily escape from the effects of these miscalculations, and will find that he has purchased for himself, perhaps at a heavy expense, that which he may make well worth the cost. It is, however, our wish to diminish as much as possible this cost, and to prevent our poorer friends from indulging in faults, which will entail on them a heavy expense not only in their gardens and their fields, but in their homes and their families; not only in their means of living, but in their comfort, and ultimately, also, in their respectability.

Let this be your first rule, that whatever you do, you do it well, you do it thoroughly; many a man is tempted to undertake too much, to engage in too many things, and consequently to do nothing well: he incurs too often the expense, but does not reap the fruits of his outlay, whether in labour or in money. He is apt to say, for instance, when order and neatness is recommended to him, all this *looks well*, and is very suitable for a gentleman, but what does it signify to a poor man like myself? The real answer to such doubts, the offspring of indolence, is that neatness and order are economy; and is it nothing to a poor man to avoid waste; in other words, to practise economy? Is it nothing to a labouring man to be able to make his tools last longer by a little care than they would without that care? to make his clothes serve him and his family better for being put out of harm's way when they are no longer wanted. Is it nothing to a poor man that the furniture of his house should supply his wants for as long a time as possible? and thus that he should be saved from the expense of having to replace it? Yet the only means of ensuring these objects are order and neatness, or, as it may be expressed in short, by letting there be a place and a time for everything, and by letting everything be kept to its place and time.

I have often seen, from a want of attention to this rule, children, and men too, laboriously collecting a scanty supply of manure from what they can pick up on the roads, when they allow the offscourings of their own houses to run not only to waste, but to become a nuisance to themselves and others. Whereas, had they but taken the trouble to collect these in a hole through a drain, which any man might make to his own house at the expense of a little labour, he would possess at hand more manure than the utmost labour of himself and his family would enable him to draw together from other sources, more, probably, than his garden would require, and he would have the additional comfort of a more clean, pleasant, and healthy dwelling. These are advantages springing directly from care, industry, and forethought; but there are many incidental benefits to be derived from these sources, which will never be guessed at till the time comes when they may be enjoyed. There are, also, many incidental losses and inconveniences not perhaps to be forseen, that may be avoided in this way; to explain my meaning, I will conclude by an extract from a very valuable French writer.

I was, (says the author in question,) once in the country a witness of the numberless minute losses, that negligence in household regulation entails. For want of a trumpery latch, the gate of the poultry-yard was for ever open; there being no means of closing it externally, it was on the swing every time a person went out, and many of the poultry were lost in consequence. One day, a fine young porker made his escape into the wood, and the whole family, gardener, cook, milk-maid, &c., presently turned out in quest of the fugitive. The gardener was the first to discover the object of pursuit, and, in leaping a ditch to cut off his further escape, got a sprain that confined him to his bed for the next fortnight; the cook found the linen burnt that she had left hung up before the fire to dry; and the milk-maid, having forgotten in her haste to tie up the cattle properly in the cow-house, one of the loose cows had broken the leg of a colt that happened to be kept in the same shed. The linen burnt, and the gardener's work lost, were worth full twenty crowns*, and the colt about as much more; so that here was a loss in a few minutes of forty crowns, purely for want of a latch, that might have cost a few sous, (or halfpence,) at the utmost; and this in a household were the strictest economy was necessary, to say nothing of the poor man, or the anxiety and other troublesome incidents. The misfortune was, to be sure, not very serious, nor the loss very heavy; yet, when it is considered, that similar neglect was the occasion of repeated disasters of the same kind, and ultimately the *ruin* of a worthy family, it was deserving of some little attention.—J. B. SAY.

But who could have expected or foreseen such a train of accidents from the trifling carelessness of not fastening a door? we may fancy some careless person, determined not to profit by experience, at least of others, to exclaim. The simple answer to such a one is, No one could have foreseen them, and no one ever does foresee an accident, otherwise an accident would never happen. So, on the other hand, no one can foresee the advantages which may befall him, if he is prepared to avail himself of opportunities of good which fall in his way. Men do not like to own themselves in fault, and hence we hear of lucky and unlucky persons, of those to whom every accident brings good fortune, and those who never can lay hold of good fortune. Chance, luck, fortune, anything, everything is to blame, rather than themselves; and in the same way, everything is to be praised for their neighbour's prosperity, rather than the care, the industry, the sobriety, and the patience of their neighbour, which, in the long round at least, are the most probable means of securing good luck as it is called. B.

* French money; equal to nearly 8*l.* 10*s.* English.

THE DAHLIA.

The Dahlia, which now forms so prominent a feature amongst our autumnal gaieties in the flower-garden, was named in honour of Andrew Dahl, a botanist of Sweden. Wildenow objected to the term, under an erroneous impression that it had previously been appropriated to another genus; and adopted the name Georgina; but he has not been followed by subsequent writers. Others objected to it from its similarity to Dalea, a genus already established, after our countryman, Dale. The name Dahlia is now, however, so well confirmed, that it may bid defiance to the caprice of modern botanical name-changers. It is, notwithstanding, very desirable that attention be paid to the proper pronunciation of the word. The *a* should have the open sound, as in father; it will then be clearly distinguishable from the older name Dalea. The genus is now principally divided into two species, *superflua* and *frustranea*, in allusion to the florets of the rays of the former abounding in seed, whilst those of the latter species are barren. Other specific distinctions were first adopted, but they all proved unstable; and from the proneness of the Dahlia to sport into such numerous varieties, it may be doubted whether the present distinction will prove permanent.

These splendid plants are natives of Spanish America, and though noticed by the Spaniards about the middle of the seventeenth century, did not attract much attention till they had flowered at Madrid, in 1790, when Cavanilles described them in the first volume of his Icones, published in the following year. In 1802, he sent plants to Paris, where they were successfully cultivated by Monsieur Thouin, who, shortly afterwards, published coloured figures and a description of them. The first introduction of the Dahlia into England was, according to the *Hortus Kewensis*, by the Marchioness of Bute, in 1789, but the plants, it may be presumed, were soon lost. In 1802 and 1803, others were sent from Paris; and in 1804, seeds from Madrid; yet, for several years, they were scarcely heard of amongst us. Their habits being unknown, their increase was slow; whilst, on the continent, innumerable and splendid varieties were produced; so that, after the peace, in 1814, they were poured upon us in all the variety of their present tints; exciting the astonishment of every beholder, and the joy of those who could number such beauties amongst their own collections. Since that time they have been rapidly increased and improved; and England can now boast of varieties as superb as any in the world.

Early sown seeds produce plants that will flower in the succeeding Autumn. The more certainly if forced on a hot-bed. Roots keep very well in sand, in a dry cellar. In dividing them, the old stems may be slit, and a portion must be retained to each plant. Plant old roots in the first week of April; or pot them, force in a hot-bed, and turn into the borders when three or four inches high. A few may be retained in large pots; they will be less luxuriant, and flower earlier. Train one stem only from each root, and pinch off the lower-side shoots. The superfluous shoots from old roots, when taken off, may be planted in the shade, under a hand-glass, and will readily grow, as will cuttings of the older stems. Or cuttings of fine varieties may be grafted on the tubers of common ones, merely by splicing them together, tying, and enclosing them in a little clay, before they are potted in mould: they should then be put in a hot-bed and shaded. A gravelly soil checks their luxuriance and produces most flowers.

[Maund's *Botanic Garden.*]

ELECTRICITY.

No. I.

General Principles.

Electricity is the term employed to designate that important branch of experimental philosophy, which relates to the properties exhibited by certain substances when rubbed against, or by some other means made to communicate with, each other. It is derived from *electron*, the Greek word for amber; electric phenomena having been first observed in that body.

Of the true nature of electricity we are compelled to acknowledge our ignorance. There is no doubt that it pervades all material bodies, animate as well as inanimate; but in what it consists, or how it is constituted, are questions too difficult for us to solve. We do not even know whether electricity is material or not. If it be, it is so subtle and refined in its nature, that it passes with inconceivable velocity through the hardest substances, and if allowed to accumulate in them, it does so without making any difference either in their weight or their dimensions. On this account it is that electricity, as well as light and heat, is denominated an *imponderable* element; to distinguish it from those forms of matter which possess the qualities of length, breadth, and thickness, and, consequently, *weight*.

Some suppose that light, heat, and electricity, are nothing more than certain attributes, or conditions of matter, inseparable from it in this terrestrial globe, and limited perhaps to the various elements of which it is composed. Or it may be that these influences extend to the whole universe; and that they are modified and controlled according to circumstances and the will of Him, who upholdeth all things by the word of his power. We know nothing of matter, nor can we form any intelligible idea of the mode of its existence, excepting in association with light, heat, and electricity; nor have we any experience of the latter elements but in combination with the grosser forms of matter.

Electricity is developed in a variety of ways; but whatever be the nature of the materials, or of the process, employed, we may justly conclude that the principle is in all cases identical, however different it may appear to be either in its effects or its mode of operation.

When a piece of glass is rubbed with silk, or a stick of red sealing-wax with woollen cloth, each substance acquires a property not possessed by it whilst in a quiescent state; and which consists in alternately attracting and repelling feathers, straws, dry leaves, fibres of cotton, and many other light substances. The electricity thus excited is called *ordinary*, and sometimes *common electricity*.

If two or more plates of dissimilar metals, as copper and zinc, for instance, are immersed in a mixture of sulphuric acid and water, and so arranged that they may not be actually in contact, but communicate with each other by means of wires, electric action ensues, and one of the metals (zinc,) is, under these circumstances, more rapidly corroded or dissolved, than it would be if the other metal (copper,) were not present. This is denominated *galvanic*, or *voltaic, electricity*.

If the electricity excited by the process just described, and which is transmitted through the wires by which the plates communicate, is made to circulate around a bar of iron, the latter has thereby imparted to it *magnetic* properties, which continue in operation only so long as the electrical energy is sustained. This is termed *electro-magnetism*.

When motion is produced at the poles of a steel

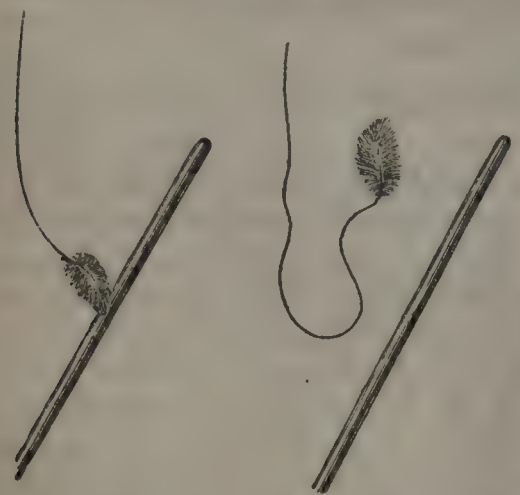
magnet either by its own rotation, or that of a piece of soft iron, by which its poles communicate, electricity is excited, and by suitable arrangements it can be made to exhibit properties precisely similar to the electricity obtained by the means already enumerated. This is called *magneto-electricity*.

If some of the metals, as bismuth and antimony, or iron and platinum, for example, are placed in contact and heated, electricity is developed. This has received the name of *thermo-electricity*.

Under these several heads, and in the order in which we have enumerated them, we propose to lay before our readers a description of the most interesting phenomena connected with this department of science. We begin with *Ordinary Electricity*, or that which is produced by friction.

The following simple articles of apparatus will illustrate electrical excitation.

Let a clean and very light downy feather be attached to a piece of white sewing-silk about three feet long, and suspended from the ceiling, or other part, of a room, in such a manner that it shall be eighteen inches or two feet distant from all surrounding bodies. Then provide a piece of glass tube, say, three-fourths of an inch in diameter and thirty inches long. The tube being perfectly clean and dry, if it be rubbed briskly with a warm and dry silk handkerchief, it will be electrically excited, and on advancing it slowly towards the feather the latter will be *attracted* by, and adhere to it; but on separating them and again bringing the tube near the feather, that body will be as promptly *repelled* as it was before attracted. After a little time the feather will again approach the tube and again be repelled by it, and this alternate action will continue until the whole of the electricity excited on the surface of the tube has been dissipated; but a fresh supply may be obtained as often as required by rubbing the tube with the handkerchief, as already described. The appearance of the feather, as it is alternately attracted and repelled by the glass, is here represented.



One of the most important principles connected with the science of electricity, is indicated by the preceding experiment; which is, that there are two kinds, or if not two kinds, two opposite states, of electricity. Thus, when the feather has received a portion of the electricity which is excited by friction on the glass, it is no longer attracted by the latter, but, on the contrary, repelled; whence it is inferred that the electricity of the feather, whilst in a quiescent state, and that of the glass after being rubbed with silk, are dissimilar; and therefore it is concluded that bodies imbued with opposite kinds, or which are in opposite states, of electricity, attract, and those in similar states, repel, each other.

The distinction to which we have just referred will be more satisfactorily shown, if we take a large stick of red sealing-wax and excite it by rubbing it with a piece of dry and warm woollen cloth. On presenting the excited wax to the feather it will be first attracted and then repelled, as noticed with the glass; but when the feather is *repelled* by the wax, if we approach it with the excited glass, it will be instantly *attracted*, and when repelled by the glass it will be attracted by the wax. It is hence sufficiently plain that the electricity developed by glass differs from that produced by wax; and whether the difference is described as being dependant on opposite *kinds*, or opposite *states*, of electricity, the effect is the same.

The electricity excited on glass used formerly to be called *vitreous*; that on wax *resinous*—terms which have now given place to *positive* and *negative*. In the experiments we have described, therefore, the feather, when charged with electricity from the glass is said to be positively, and when charged from the wax, negatively, electrified.

By the terms positive and negative is implied, that in one case, the substance electrified contains *more*, and in the other *less*, than its ordinary proportions. But this explanation is probably more convenient than it is philosophical—a fact to which we shall have occasion to refer more at length by-and-bye.

Many substances used by us in the common affairs of life are susceptible of electrical excitation, and we often produce electrical phenomena without being conscious of it. We may cite an example or two.

In cleaning glass mirrors with an old silk handkerchief, or a very dry linen duster, it generally happens that small fibres and particles of dust accumulate on their surfaces, the more rapidly in proportion to the labour bestowed in removing them. The same thing occurs in wiping decanters and other articles of glass, and especially the glass chimneys used on gas-burners. In all these cases electrical excitement is produced by friction, and the fibres, disengaged from the duster, as well as the dust floating in the surrounding atmosphere, are atttracted by the glass, and adhere to it, as already shown with the glass tube and feather.

Silks of all kinds are highly electric; as are also most of the precious stones, a great variety of resinous substances, the paste of which false gems are made, the hair and fur of animals, paper, sulphur, and some other minerals; india-rubber (caoutchouc,) and certain descriptions of wood, when thoroughly dried by baking.

Among domesticated animals the cat furnishes a remarkable instance of electrical excitability. When dry and warm, the back of almost any full-grown cat (the darker its colour the better) can be excited by rubbing it with the hand, in the direction of the hair, —a process which is accompanied by a slight snapping sound, and in the dark by flashes of pale blue light.

The substances which were just now mentioned as highly electric must be understood as being intended merely as specimens. All subjects, without exception, are undoubtedly capable of being electrically excited; but some require more complicated arrangements than others. The reason of this we shall next proceed to explain.

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DARTMOOR, DEVONSHIRE.

THE GRAY WETHERS, DARTMOOR.

..... A holy peace
Pervades this moorland solitude—the world,
And all who love that world, are far away!—CARRINGTON.

DEVONSHIRE is one of the most picturesque and romantic portions of our island. Its natural scenery, both maritime and inland, is of the highest order; and combines every variety that can either charm the eye or interest the imagination. The tourist may trace the mountain torrent from its source, brawling over a wild and rugged channel through rocky glens or moorland wastes; or behold it gently meandering through some luxuriant valley, where its fresh and limpid waters diffuse life and loveliness over the softened landscape;—the antiquary may ponder over ruined castles, and mouldering fanes, with their shattered arches and crumbling cloisters, the relics of a former age, or recognise the remnants of a still more remote period, in the semblance of moss-grown cromlechs and fallen columns.

The central part of the western district, extending from the vale of Exeter to the banks of the Tamar, chiefly consists of the very remarkable region called DARTMOOR, a district distinguished in a striking degree from any other in England, and of which we purpose to lay before our readers as full and popular an account as is compatible with the space of the *Saturday Magazine*.

This great "Devonshire Wilderness," or "wild morisch or forest ground," as it is called by Leland, is about twenty miles in length, and of an average breadth of about eleven; stretching in a line from east-north-east, to west-south-west. It contains, according to the latest authority, a superficies of 130,000 acres, affording only a scanty pasturage to sheep and cattle.

The external aspect of this interesting district is extremely wild and dreary, presenting an almost endless continuation of lofty hills, craggy rocks, and narrow valleys strewed with enormous masses of granite, which some convulsion of nature in by-gone days has probably severed from the surrounding eminences. Indeed, innumerable masses of stone of various dimensions lie scattered over the general surface of the Moor, and those which lie on the sides of the hills, are moulded into the wildest and most impressive forms imaginable. Some of these heights rise abruptly into peaks, crowned with huge piles of stone, and are called "Tors." To a person standing on one of these lofty points, the surrounding country wears the appearance of an irregular broken waste, which may be best compared to the long rolling waves of a tempestuous ocean, fixed into solidity by some instantaneous and powerful impulse. Gilpin, in his work on the western parts of Devon, in allusion to this, says that, "Dartmoor spreads like the ocean after a storm, heaving in large swells." Even at a distance, this desolate wilderness has the same billowy

aspect, which in every zone, according to Humboldt, is the prevailing feature of primitive formations.

During the season of Winter, the Dartmoor hills are generally enveloped in fogs and vapours, through which the sun with difficulty penetrates; but in fine weather, their hue is liable to a constant change from sombre gray to a deep azure, owing to the state of the atmosphere, and the alternations of light and shade. One of the most striking features in this dreary region, is the almost total absence of trees and dwellings. An intelligent writer in alluding to this, says, "There is on Dartmoor a stillness, a want of life and activity, and a lofty dignity of expression in its black and barren pastures, which can only be seen in similar ranges of uncultivated lands."

From the numerous remains of round houses—standing singly, but more or less near each other, built in the most primitive manner of unwrought stones without cement, varying in diameter, the largest not exceeding twelve feet—there can be no doubt that Dartmoor and its borders in the early ages were rather thickly inhabited. These edifices are attributed to the ancient Britons: indeed, we have partial confirmation of the surmise from Cæsar, who says that the houses of the Britons were built singly; and the Rev. Mr. Fosbrooke, in his learned dissertation on British Antiquities, gives a representation of a dwelling of this people, which corresponds with the remains on Dartmoor.

There are also several Druidical or Celtic remains on the Moor, as the circles, the logans, and the rock basins abundantly testify. At Drewsteignton, there is a very remarkable logan, or rocking stone, in the rocky channel of the Teign river, but its oscillating powers have nearly ceased. The base or under-stone of this vast mass of granite is deeply set in a bed of rocks, of which, indeed, it forms a part. The logan stone is of irregular shape, its height, or thickness, varying from six or seven to ten feet; its length is about eighteen feet; the top flattish. When rocked, it is said to have emitted an audible murmur of a peculiarly awful nature. The scenery around this monument of a remote age, is of uncommon grandeur. There are one or two other logan stones in the same neighbourhood, but of less dimensions. The only cromlech on the Moor, is at Shilston, near Drewsteignton, which bears the name of the Spinster's Rock, from an absurd tradition that three spinsters, or unmarried damsels, constructed it one morning for their amusement before breakfast. Chappell considers this cromlech as a druidical place of judicature, or perhaps intended for astronomical purposes. On the higher part of Dartmoor are two circles called the "Gray Wethers," from their fancied resemblance, at a short distance, to sheep. They are situated directly under Sittafond Tor, and consist of thirty stones, each varying from three to five feet in height, and from seven to nine feet apart, according to their size. Not more than half of them are erect, some being thrown down, and others removed. Both circles are sixty feet in diameter. Barrows, or ancient graves, are common on several of the downs, and on Quarnell Down in particular, there is a barrow ninety-four paces in circumference. Some of these ancient places of sepulture have been opened, but only fragments of bones and urns were found.

Dartmoor gives rise to a large number of rivers and mountain-streams: the scenery on some is very peculiar, and in many respects almost unequalled in interest and beauty, particularly in the wilder and more secluded parts of the region, and in the vicinity of the coast. The principal rivers are the Dart, (which imparts its name to the Moor,) the Teign, Tavy, Taw, and Plym, which all take their rise in the northern quarter of the district, chiefly from a range of hills called Cranmere; and, with the exception of the Taw, travel southward towards the British Channel, and give their names at their embouchures, to several ports and watering-places, some of which are of considerable importance.

The numerous brooks and torrent streams of the Moor also rank among its distinguishing features. As the country is one continued slope from its highest elevation to the sea, many of the streams rush with headlong fury, along deep and shadowy ravines, mountainous elevations rising in frowning grandeur over the tumultuous waters at their feet, which, all wildness and power, hasten on to mingle with the ocean beyond, or unite with some stately river. There are in Dartmoor, or on its immediate borders, not fewer than five principal rivers, twenty-four secondary rivers, fifteen brooks, two lakes, and seven heads; or, altogether, fifty-three streams. This superabundance of water is occasioned by the spongy nature of the land, which retains the heavy showers that so frequently fall in the western counties, until the waters in the extensive morasses gradually overflow. In this manner, and from almost as small beginnings, do some of the most mighty rivers in the world take their rise, and are evidences of the many and ever bountiful provisions which the all-wise, and supreme Author of nature has furnished for the use and benefit of His creatures. The roaring of the various torrents of water in the Moor, after heavy rains, and when the wind favours the transmission of the sound, is very grand, and especially striking to those who have never heard this impressive music in this "wild and wondrous region."

One of the peculiarities of Dartmoor and the surrounding country, are the Tors, or as they are called by the native poet of the district, with a poet's license, "Mighty Tors." The word *tor* implies, in the Celtic and other languages, a beacon or fire-tower, and some of these hills were formerly used for this purpose. There are none that rise to any very lofty altitude, Rippen Tor, which is considered amongst the highest, being only 1549 feet above the level of the ocean, an elevation not greatly exceeding that of the Malvern Hills in Worcestershire.

Hey, or High Tor, is perhaps the most remarkable of the series, and when illumed by the rising sun, its rocky summits may be distinguished at an amazing distance. It consists of a double peak, or two large but separate columns, with steps cut in the solid stone for ascending each; and from the summit there is a magnificent view of the coast, stretching to the east as far as the cliffs of Dorset, and embracing on almost every point of the compass, a rich and diversified mass of heath, woods, rocks, meadows, rivers, towns, and villages. This tor is celebrated for its peat or blackwood, and the rarity of its mosses and lichens. Some of the tors are supposed by geologists to be extinct volcanoes; but this is not supported by facts, though the conical form of several might perhaps warrant that conclusion. In the seventy-fifth volume of the *Gentleman's Magazine*, it is asserted that Bren Tor, near Tavistock, has a volcanic origin; and looking at its conical form, and the porous nature of the rock which composes it, there may be some grounds for the supposition. Crockern Tor, so well known to antiquaries, at least by name, stands about a mile distant from a place called Two Bridges, in the east quarter of the Moor, of which it is considered by some to be the centre. The president, or judge's chair, part of the bench for the jurors, and three irregular steps for ascend-

ing, are still partially visible, and as an interesting relic of old British manners, and a memorial of the Saxon *Witenagemot*, or earlier parliament of the realm, must always command respect.

In the valley of the Cad, near Shaugh Bridge, rising perpendicularly from the margin of the stream, is a remarkable cliff, or mass of rock, called the *Dewerstone*. The surface is profusely overgrown with thick and variegated underwood, consisting of ivy and other parasitical plants, which spread their luxuriant foliage over its jagged and shattered front, as if anxious to bind up the wounds that time and tempest have inflicted. The view from the summit into the awful depth beneath, is very impressive.

Shaugh Bridge crosses the river Plym a short distance below the junction of that river with the Cad.

> . . . . . How oft, as noon
> Unnoticed faded into eve, my feet
> Have lingered near thy bridge, romantic Shaugh;
> While, as the sister waters rushed beneath,
> Tumultuous, haply glanced the setting beam
> Upon the crest of Dewerstone. The hawk
> Rested upon the aged cliff;—around
> A holy silence reigned;—the mountain's breast,
> Lay hushed as midnight;—not a vagrant gale
> Sighed through the woods of Plym, and on the soul
> Fell deep the impressive calm.—Carrington.

The scenery of the Plym is of extreme beauty, and ranks amongst the finest in the kingdom. In consequence of the number of rivers and streams which flow through Dartmoor, nearly one hundred and fifty bridges have necessarily been erected by the county at various periods.

A Railway between Prince Town and Sutton Pool, near Plymouth, a distance of more than twenty-five miles, was opened for public use in September, 1823, at a cost of 39,983*l.*, raised principally by the influence of Sir Thomas Tyrwhitt, who subscribed upwards of 3000*l.* towards the undertaking. The railway was projected by the same spirited individual in the beginning of the year 1818. A company was subsequently formed, and incorporated as the Plymouth and Dartmoor Railway Company. Immense quantities of granite of the finest quality are conveyed on it, and shipped for London and other large towns.

Prince Town, a small place containing about thirty houses, so called in honour of his late majesty, when Prince of Wales, is worthy of notice, as being the site of Dartmoor Prison, where, during the late war, a great number of prisoners were confined. From May 29, 1809, to April 22, 1814, no less than 12,679 unhappy victims were incarcerated there; about 1117 deaths occurred during that period, of which 1095 were French, and twenty-two Americans. This immense and remarkable structure is exceedingly well adapted for the object designed. Elevated at least 1400 feet above the sea, it comprises within its walls a circumference of thirty acres, enclosed on its eastern, northern, and southern directions, by a lofty wall, and on the western part, or front, which being straight, blunts the circumference, by two handsome residences appropriated to the agent and surgeon, and having between them a Cyclopean gateway, surmounted with the motto, "*Parcere subjectis.*"

Sir Thomas Tyrwhitt, the originator of the railway, first suggested the idea to government, and as the prisons at Plymouth had become old and inconvenient, it was determined to erect this building from the plan of Mr. Alexander. The first stone was laid in March, 1806. The edifice is principally composed of the granite so plentiful on the Moor, and was completed at a cost of about 127,000*l.* A portion of the building, comprising two of the prisons, the dwellings for the inferior officers, and the walls of the chapel and parsonage-house, were erected by French, and the interior of the chapel was fitted up by the American prisoners, who were paid a daily sum for this labour; a mode of employment which tended to alleviate the tedium of their captivity, and increase their comforts. The various parts of the prison were thoroughly supplied with excellent water from an inexhaustible reservoir filled by a branch of the river Walkham, diverted for that purpose.

The air of Dartmoor is exceedingly healthful and invigorating; one proof of which is to be found in the fact, that the "Moorsmen," as they are locally termed, are famed for feats of strength, especially wrestling. Many of the inhabitants attain a great age. The farmers lead a very laborious life in cultivating the barren lands in the vicinity of their habitations; nevertheless, they seem happy and contented with their lot, and, as is generally the case in all wild and moorland districts, they appear greatly attached to the soil which gave them birth. Many of the cottagers maintain themselves by digging peat fuel from the extensive bogs, which is chiefly sent to that district of the county termed "the south hams." Others job in cattle, and drive a humble trade in garden produce, &c.

Dartmoor, in former days, particularly when covered in a greater or less degree with wood, is said to have abounded with wolves, boars, badgers, and other wild animals. The wolf was not extinct in Dartmoor, according to Howel, even so late as the reign of Elizabeth. Wild cattle, similar to the aboriginal species preserved in Chillingham Park, Northumberland, formerly abounded. The red deer and stag have now nearly abandoned it, the former being chiefly to be met with in the north of Devon. In the time of Henry the Third the stag was common. Foxes, hares, and rabbits, are still very numerous. The moor-horse, or more properly pony, is an active little animal, but seems to be left almost entirely in a state of nature.

Some writers have supposed that Dartmoor, in the old time, was luxuriantly covered with wood, and, indeed, at various periods the trunks, branches, and roots of trees, chiefly oak and birch, have been discovered in several parts, at different depths from the surface of the ground, some even so low as six or eight feet. The wood, from its contact with the marshy soil, is black, and after exposure for a time to the sun and air, becomes exceedingly hard. The solitary remains of the forest called the Wood of Wistman, so beautifully alluded to by Carrington, as "Dreary in aspect, silently decaying," stands on a slope, near the West Dart, to the north-east of Crockern Tor. It consists of scrubbed decrepit trees, chiefly oak, scarcely exceeding seven feet in height; their branches almost destitute of foliage, overrun with moss, brambles, and other parasitical plants, exhibit a scene of uncouth and cheerless desolation. The circumference of some of these hoary foresters almost equals their height. Wordsworth truly says,—

> I looked upon the scene, both far and near,
> More doleful place did never eye survey;
> It seemed as if the spring time came not here,
> Or nature here was willing to decay.

Several laudable attempts, on a large scale, have been made at various periods to plant and improve Dartmoor, and it is extremely probable that it will be ultimately enclosed. A recent writer observes,—

What has been effected affords a manifest proof, not only of considerable attendant advantages, but of the perfect practicability of doing more. In the wastes surrounding the moor barrenness is gradually disappearing, and softening into verdure and fertility. By judicious measures

sterility might be wholly banished, excepting where the peat earth lies immediately upon the granite rock. The soil of the neighbouring vales is of superior quality, and consists of rich friable loams; and even on the moor itself are spots forming oases, as it were, in a desert, and highly susceptible of useful conversion.

The same writer says,—

That the moor was once cultivated is evident, from the traces of furrows or ridges, and stone inclosures, still remaining upon and around it, and from the lower layers of thatch in the roofs of its old buildings being rye-straw, which probably was the grain then raised.

NOTES ON FOREST TREES. No. XXV.

THE HAZEL, (*Corylus avellana.*)

THIS well-known tree seldom exceeds twenty feet in height, and from its mode of growth and size may be called indiscriminately a small tree or a large shrub. It appears to be a native of all the temperate portions of Europe and Asia.

The south of Spain produces great quantities of hazel nuts, which are exported in considerable numbers to other parts of the Continent, particularly from the port of Barcelona, by which name all the Spanish nuts are known. It seems to have been looked upon by the ancients more in reference to the superstitious practices in which it was employed, than on account of its useful properties. Pliny says torches were made of its branches at marriages, the burning of which was supposed to be *lucky* to the young couple. In more recent times advantage has been taken of the folly of mankind by its employment for the purpose of discovering metals, water, hidden treasure, lost property, &c., by means of a *divining rod** formed of a twig of Hazel. The impositions that have been practised by designing persons by the aid of this instrument are almost incredible, and even at present it has not fallen entirely into disuse.

* See *Saturday Magazine*, Vol. IX., p. 36.

"The Hazel," says Sir Thomas Dick Lauder, "which, besides making up a prominent part of many a grove in the happiest manner, and tufting and fringing the sides of many a ravine, often presents us with very picturesque stems and ramifications. Then when we think of the lovely scenes into which the careless steps of our youth have been led in search of its nuts, when Autumn had begun to brown the tops of their clusters, we are bound to it by threads of the most delightful associations with those beloved ones who were the companions of such idle but happy days."

The Hazel appears to flourish in almost all descriptions of soil, but it succeeds best, and its fruit is larger and finer flavoured, in a light and moist earth. It is extremely hardy, and its blossoms appear very early in the Spring, even if the weather is severe. The stem is surrounded with numerous young shoots, which offer a very easy method of propagating the tree. But it may be grown from the seed; in this case, the nuts should be put into the ground in the Autumn, soon after they are gathered, and the young plants will appear in the next Spring. If the sowing of the nut is left until the Spring, they must be preserved through the Winter in dry sand, to prevent their becoming rancid; the trees reared in this last manner are much more vigorous, and acquire a greater height than those produced from suckers.

The fruit of the common nut is thought but little of, but the filbert, which is merely a larger variety produced by cultivation, is considered worthy of a place in the dessert. The wood of the Hazel when young is extremely flexible, and in some places it is much used in the manufacture of baskets. Nut-oil is expressed from the kernel of the Hazel nut, and is sometimes employed for the same purpose as olive-oil: it is also used by painters in oil colours, but the greater proportion of oil sold for this purpose as nut-oil, is merely a refined linseed-oil.

LEAVES, CATKINS, AND FRUIT OF THE HAZEL.

ON WRITING MATERIALS.

No. V.

The Manufacture of Writing-Paper.

In our last article on this subject, we gave a general description of the different kinds of paper, and a short account of their history, and of their introduction into this country. We shall now describe the modes of manufacturing this useful article in England.

In this, as in almost every case, the earlier specimens were produced by a greater share of manual labour than is employed at present, the inventions of modern times having enabled us to substitute machinery in almost every branch of manufacture. The result of this is, that society in general is supplied with better productions, in larger quantity, and at a cheaper rate than formerly. Such is the case with the paper manufacture. Those processes which are now performed almost entirely by machinery used to be performed by hand. We will treat first of the mode of making paper by hand.

The rags of which the paper is made are sorted into different qualities, according to the kind of paper which is required. The rags are then carried in bags to the rag-house, where women cut them up into pieces three or four inches square. They sit at a table formed of wire-work, across which is placed a knife, with the sharp edge uppermost. The woman at the table takes up the rags piece by piece, removes all impurities, such as buttons, seams, &c., and cuts the rags into small pieces, by drawing them along the edge of the knife, the impurities, dust, dirt, &c., falling through the wire top of the table into a drawer beneath. At her side is placed a box, divided into several compartments, into which she throws the pieces which she has cut; different compartments being chosen for different qualities.

The rags are then examined by "overlookers" or "overhaulers," to see that the work of the cutters has been properly performed; after which the rags are put into a cylinder, called a *duster*. This is about four and a half feet in diameter, and five feet in length, and is formed of wire cloth. A door in the cylinder is opened, a hundred weight or more of rags are put in, and the door is closed. The cylinder is then made to revolve rapidly, and as the rags are whirled about within it, they are caught and separated by spokes or arms which are inserted in the axis of the cylinder. By this means, the dust and dirt are completely shaken or beaten from the rags, and passes out through the wire cloth of the cylinder.

The rags are then boiled in water, which contains from four to ten pounds of carbonate of soda and a little quick lime to every hundred weight of rags. The boiling is continued for about eight hours, after which the contents of the boiler are allowed to cool very gradually. The boiled rags are then taken to the engine-house, to be reduced to pulp, which is effected in two engines, the *washing* and the *beating* engines. The washing-engine is a trough ten feet long, four and a half wide, and two and a half deep, made of wood, lined with copper or lead, or else made wholly of cast iron. In this engine a cylinder, called a *roll*, revolves, which is generally made of a solid block of elm, two feet long and two feet in diameter. Bars of steel are fixed to the circumference of the roll, parallel to one another, and also to the axis. These bars are about thirty-eight in number, and are from three-eighths to half an inch thick.

This roll revolves on a horizontal axis, so as to come nearly in contact with a plate fixed in the bottom of the trough. This plate has a number of steel bars projecting upwards from it, which are arranged in a direction somewhat inclined to the bars on the roll, so that when the rags are drawn between the roll and the plate, the bars in the two latter act somewhat on the principle of a pair of scissors. The trough being half filled with water, about a hundred weight of rags are put in, and the cylinder is put in motion. The bars catch up the rags, carry them half round, and dash them against a curved surface, called the *backfall*, down which they are again brought beneath the cylinder. A number of small holes at the bottom of the trough carry off the dirty water, which is separated from the rags by passing through a wire cloth, which is too fine to admit the rags. The rags are brought, by the continual revolution of the cylinder, again and again between the cylinder and the plate, where they are bruised and worked down to a pulp. The bars are made blunt, as it is deemed desirable that the rags should be bruised, rather than cut, into a pulp. A constant supply of pure water is admitted to the rags in the trough.

This process of washing occupies about three or four hours; after which the pulp is allowed to flow from the trough through a six-inch pipe into the *draining-chest*, which is situated in a lower floor of the building, and which is perforated with small holes, to let the water drain off from the pulp.

The pulp is then *bleached* in one of two ways—either by exposing it to the action of chlorine, in the state of a gas; or by steeping it in a solution of chloride of lime: the latter plan appears to be the most advantageous. If the first plan be adopted, the pulp is boiled in an alkaline solution of lime for several hours, after which it is washed in clear water, to remove the solution. The water is then pressed out, and the pulp is exposed to the action of chlorine, which is procured, in leaden retorts, from sulphuric acid, sea-salt, and the black oxide of manganese. In the other method of bleaching, the pulp is removed from the draining-chest into stone bleaching-chests. About one hundred weight of pulp is put into each chest, and six or eight pounds of chloride of lime, dissolved in twelve gallons of water, are poured in. The chest is then filled up with water, or with weak liquor, which has been previously employed in the chests.

After having been steeped in the bleaching liquid about twenty-four hours, the pulp is transferred to an iron box, in which it is carried to a Bramah press, where it undergoes a powerful pressure, which forces out as much as possible of the solution from the pulp. The pulp then undergoes another process of washing, in order entirely to remove the remains of the chloride.

The pulp is then allowed to flow into the *beating-engine*, which is almost entirely similar to the washing-engine, except that the bars are sharper, so as to exert a cutting action on the pulp: it is reduced to fibres, about an eighth of an inch in length; and after being subjected to this action for four or five hours, the pulp, which is now called *half-stuff*, is allowed to flow into a large stone chest. From the chest the pulp is either ladled, or flows through a valve into a *vat*, which is a stone vessel, about six feet square and four deep, and through the middle of which a wheel revolves, in order to keep the pulp constantly stirred.

The sheets of paper are made in moulds, formed of wire-cloth, fixed upon a frame. The wire-cloth is supported by ribs of wood, laid about an inch asunder across the frame. Paper made in such moulds is called *wove* paper, because the wire is woven into a cloth; but the wires are sometimes laid side by side in one direction only, which produces *laid* paper.

A workman, called the *vatman*, has in his hand a

slight frame, called a *deckle*, which he places on the mould, in order to form a raised edge or border to the latter. He then dips the mould into the vat, and takes up a quantity of pulp, which has been rendered fluid by being mixed and worked up with water. After jerking off some of the superfluous pulp, he shakes the mould in a horizontal position, by which the pulp forms a thin layer, from which the water drains through the wire cloth. He then removes the deckle, and hands the mould to a workman, called the *coucher*, who rests it in an inclined position, to drain more completely. The coucher then places a piece of felt on a board, and turns the mould over with its face down upon the felt, by which the thin film of pulp is transferred from the mould to the felt, in a wet but slightly adhesive state. While this is being done, the vatman is moulding another sheet of pulp, which the coucher transfers as before to another piece of felt, which is placed on the last made sheet. Thus they proceed, until from four to eight quires of felts, with sheets between, are collected in one heap, called a *post*. A heavy plank is then placed upon the post, and the whole are removed to a press, where they undergo a powerful pressure, which forces out much of the remaining moisture.

The sheets are now sufficiently adhesive to be handled; so that a workman, called the *layer*, takes the felts and the sheets one by one off the post, laying the sheets in one heap, called a pack, and the felts in another. These packs are then again pressed, by which the remaining water exudes in drops. If this pressure be too long continued, the sheets adhere together, and tear one another. The sheets are then parted, and placed with their other surfaces in contact, and again pressed, in order, to remove the marks of the felt.

The sheets, being thus made, they then undergo a process of *drying*. Posts, about ten or twelve feet high are fixed at distances of about ten feet from one another, and have moveable pins inserted in them at different heights, to support spars of wood which extend from one post to another. Between each pair of these spars ropes are stretched about five inches asunder. The workman takes up three or four sheets of paper, on an instrument shaped like a T, and passing it up between the ropes, leaves the sheets hanging over the latter. This he does until all the ropes are filled. All these posts are situated in a room, called the drying-room, to which the admission or exclusion of air can be regulated by shutters, which open or close in the sides. The drying is left to be performed by the wind; or else steam-pipes are carried through the room.

The next operation is sizeing, except in some papers in which the size is introduced into the pulp. The size is made of pieces of skin or sheep's feet, or other glutinous substance, boiled to a jelly in a copper, strained, and a little alum added to it. The workman takes four or five quires of paper, and dips them into the size, taking care that the size shall penetrate between each two sheets; after which the sheets are moderately pressed, to expel a portion of the size, and are then separated and hung up in the drying-room, where they are slowly dried. In some manufactories the sizing is effected by placing the paper on a frame, which is lowered into a tub, where hot size is allowed to flow upon it. The sheets are then carried to the finishing-house, in which they are again pressed, and a number of women pick out the knots which may be in them with small knives, and separate the perfect from the imperfect sheets; after which they are again pressed, and lastly counted, and folded into quires and reams.

Those papers which are called hot-pressed are placed between two sheets of pasteboard,—paper and pasteboard being placed alternately,—and a hot iron plate being placed at about every fortieth or fiftieth pasteboard.

Such is a general outline of the mode of making paper by hand; and although improvements have been made in every part of the process, yet the above will give a general idea of the number of processes which are performed. We will now briefly describe the mode of making paper by machinery.

The pulp is prepared much in the same way in most methods, but the distinguishing characteristics are in the moulding and subsequent processes. In Fourdrinier's method, the pulp is placed in a large vat, in which are two agitators, to prevent the pulp from settling; from whence it is discharged by a sluice into a cistern, where, after being strained through a machine, to exclude knotty portions, &c., it flows upon an endless wire-cloth, which is twenty or thirty feet long, and which passes over several rollers, so that the film of pulp which streams down upon the wire-cloth travels along this extent of surface, by which it becomes tolerably equable in thickness, loses much of its moisture, and acquires a certain degree of tenacity. The wire-cloth has a shaking motion given to it during the operation, by which the separation of the water is further effected. When the pulp has arrived at the last roller on endless cloth, it passes between two rollers, and then falls on a web of felt, on which it is carried along as before, and passes with the felt between two other rollers, by which it is pressed, and is now sufficiently firm to be handled as one continuous sheet of paper.

It then passes over and between a number of cylinders which are heated from within by steam; so that after passing over about thirty linear feet of heated surface, the paper is dry. In no part of paper-making is the advantage of machinery more decided than in the rapid drying by these means. From the heated cylinder the paper is wound on a reel, surface after surface, until a great thickness is attained, which is cut into sixteen or eighteen quires by a sharp instrument; after which they are removed to the drying-loft. By these contrivances the method of dipping a mould into the pulp, and taking out a portion of it, is entirely discarded.

Another great improver of paper-making is Mr. Dickenson. In his arrangement, a cylinder covered with wire-cloth is made to revolve over and just in contact with the prepared pulp, and to take up some of the pulp in the following manner. The pulp is made to flow through a sluice, by which its quantity may be regulated, into a vessel, against the bottom of which a brass cylinder rests. This cylinder is smooth and bright inside and out, and has a number of holes bored in its surface: on the outer surface is spread an endless web of wire-cloth. When this cylinder revolves on its central axis, a portion of the pulp adheres to the wire, on account of the cylinder dipping into the vessel in which the pulp is contained. Before this stratum or film is received on a felt, or drying-web, it is deprived of nearly all its moisture by a very peculiar process. One portion of the inside of the cylinder is enclosed into the form of a box, or chamber, which does not revolve, and which is connected with the receiver of an air-pump. When the receiver is exhausted of air, the chamber becomes likewise nearly exhausted, so that when that portion of the surface of the cylinder which contains the pulp passes over this vacuum, the external air presses the pulp so closely to the wire, that all the water is driven through into the

interior of the cylinder. It is for this purpose that holes are left in the substance of the cylinder, that the vacuum within may act upon the pulp which is spread on the wire-cloth on the outside.

All these after-contrivances, such as the vacuum, &c., are to facilitate the drying of the pulp. Directly after the film of pulp has been thus dried, it is then taken off by an endless band of felt which passes over another cylinder, and is pressed between two rollers, much in the same way as we described in Fourdrinier's method. The water which flows from the pulp through the wire-cloth, into the hollow of the first cylinder, is carried off by means of a pipe, which acts, as the axis round which the cylinder revolves; and as this water frequently contains a small quantity of pulp, arrangements are made for conveying that pulp back again into the vat.

One of the great advantages of machine-made paper, is the large size which can be given to the sheets. A sheet of paper for a double number of the *Times* newspaper, if made by hand, would require a mould of most unwieldy dimensions, and would be in every respect difficult to work. Paper-hangings have been greatly reduced in price, by being made in one piece twelve yards long; whereas small sheets had to be pasted together, under the old system.

Such are the modes now adopted for making paper. In some parts of the Continent, the rags are still reduced to a pulp in the original mode of stamping or beating. They have mortars cut in solid oak, the cavity being two or three feet in diameter, and a hole in the middle of the cavity being left to carry away the water. Large hammers with teeth act perpendicularly in these cavities, and cut the rags to small pieces. This rude method is, however, almost exploded at the present day.

INTEMPERANCE.

Fresh is fair beauty's cheek, and bright
Within the festive room,
Yet may not brook the morning light,
When night has brushed its bloom.
And bright is valour's mailed vest,
Yet soiled in nightly jar;
It may not bear with ruffled crest
To meet the morning star.
But more unseemly is the view,
When morning beams are poured
On signs of revelry, that strew
The late carousal board.
And still unseemlier than the signs,
On that foul board you trace,
Are the deep-drawn inveterate lines,
That mark the reveller's face.
The brow with clammy moisture spread,
The beating pulse, the languid head,
The cheek's pale glow with wrinkles hid,
The bloodless lip, the heavy lid,
The reddening eye's unsteady glance,—
These are thy marks, Intemperance.

[*The Rubi, a Tale of the Sea.*]

That another state of life there must be for every creature wherein there is the breath of life, he was verily persuaded. To that conclusion the whole tenour of his philosophy led him: and what he entertained as a philosophical opinion, acquired from a religious feeling something like the strength of faith. For if the whole of a brute animal's existence ended in this world, then it would follow that there are creatures born into it, for whom it had been better never to have been, than to endure the privations, pains, wrongs and cruelties inflicted upon them by human wickedness; and he would not, could not, dare not, believe, that any, even the meanest of God's creatures, has been created to undergo more of evil than of good, (where no power of choice was given,) much less to suffer unmingled evil, during its allotted term of existence. Yet this must be if there were no state for animals after death.—The Doctor.

USES OF SOME OF THE INORGANIC SUBSTANCES TO MAN.

If, under the peculiar appointments for man, shelter has been rendered as imperious a necessity as clothing, if substances have been prepared for this purpose, which he has been gifted with ingenuity to apply, and if he has been further provided with intellect to effect this end in a progressively superior manner, which, if had not, he would have been judged less worthy of his Maker's regard than the beaver and the bee, we ought to believe that the means were created for him, even more than the wool of the sheep, since to all other animals they serve no purpose. It is an inconsiderate or a fanatical judgment, which thinks that a Being so great and so powerful could not have attended to such trifles, or which thinks Him insulted by such a supposition. Compared to Himself, what is there worthy of his notice? He who cares for the minutest insect as for man, cannot have judged anything beneath His regard; and if He has provided for the wants of even the living atom which escapes the microscope, it is our duty to believe that He has neglected nothing which could concern our own, infinitely more numerous and complicated as they are, even to the production of a sandstone for building, a limestone for cement, and a slate for roofing.

Is it that associations like these are deemed improper? Let the student of creation accustom himself to think otherwise, else will he fail to discover that the hand of God is in all His works, and learn to neglect Him. Or is it that such attentions are deemed mean, because our own pride, or negligence, or selfishness, prevents us from following those examples of beneficence which He gives us? His ways, indeed, are not as our ways; but were we to endeavour to make our conduct more like His, if only in this, human nature and human life would present far other aspects than they now do. Instead of charging with fanaticism or folly, what may appear vulgar or fanciful attempts to illustrate His goodness, let us rather labour to do as He has done, and equally careless of the ingratitude with which it is received, to persevere in beneficence. Little, indeed, it is that we can effect, but it were well that we even desired to do for each other what He has done from the beginning, and is continually doing for us, ever thoughtless and ever ungrateful.

Are these superfluities, sources of pure pleasure, luxuries, provided for us in these appointments, as in all else? The latter term possesses a vulgar association with what is vicious or forbidden, as do even the former, in minds tinged with ascetitism. But he who would separate pleasures from uses, would require to think more deeply than is usual on such subjects; he who condemns luxury has never thought at all; and he, the acetic, forgets that the beneficence of God has not been limited to the mere supply of needful wants. It is not from him, at least, that reason or religion will take the character of the Universal Father.

In granite, we find a stone so well calculated for durability, so beautiful and various, and so submissive to our tools, that it has been selected from the earliest periods of civilization, as the material for those works which record the power and knowledge of nations. Often, too, their architecture is the only portion of their history which has descended to us: and if it is important for us to know under what forms man has preceded us, what he has thought, known and done, what has been his political condition, what his astronomical knowledge, what his mechanical attainments, what his progress in the arts

of taste, so intimately connected with his general mental cultivation, it is here that we must often seek this information, while thus, also, we often attain to know what his religion has been, under the strange forms which that has assumed. Can we then believe that even the luxury of architecture is unimportant in the eye of the Deity?

And if thoughtlessness should condemn the immense, and apparently useless labours of ancient Egypt, so are they easily condemned, under the use of the ever-acceptable term tyranny, the ever-ready word of him who abuses all the power which he can command. Yet he who would eat must labour: it is the unvarying law, not of God alone, but of human society; the bond by which it is held together. The soil of Egypt was the possession of its singular government, and the labour of the people was the only manner in which they could demand or acquire a share of the produce: it was the only mode in which they ought to have possessed their portions. There is reason to believe that the soil had appropriated all the labour applicable to it; and commercial industry, as it then was, had probably done the same. An artificial invention to occupy labour, became, therefore, imperiously necessary; and through this was Egypt peopled, to an extent which seems to have been very great. The bearing of this fact on other cases, where, under a general law pervading all creation, conditions of labour have been attached to possession, must be obvious: and though tyranny had been the immediate cause, even thus does the Deity often direct the wickedness of man to his own good ends.

Sandstone demands no particular remarks; but had the fissility of slate not been known, it would scarcely have been credited, especially by those who know that it does not occur in consequence of its stratified disposition. That rock was once a solid mass of clay, deposited horizontally, in slow succession, and afterwards indurated. It should have separated into leaves, as the shales do, in the same direction in which it was deposited, if it was to split at all, and there is, therefore, no contingency in the present very different result. The law is a peculiar one; whether intended for the useful end others may judge: it is not, however, the exception which it has been called. Let no one ever perplex or suppress the truth, above all in questions of the present nature. The same law acts in other rocks, but nowhere to the production of so perfect an effect.

The contrivances in the preparations for limestone are much more remarkable than even in the case of coal, and they are acting daily under our eyes, both for present and future purposes. And if animal life here contributes in more than one mode, thus are, ultimately, beneficent ends attained, through means involving a primary mass of beneficence which defies all means of estimate, in the granting of happiness with life to uncountable myriads of beings, through ages which we vainly attempt to conjecture. If it is now superfluous to speak of the uses of this rock in architecture, I may at least note, that they depend on a combination of chemical arrangements which we had no right to expect, and have not long discovered.

It has been among the designs of the Creator, to confer on clay the property of being converted into stone by the aid of heat: while under a variety of appointments in the constitution of these earths, we possess all the uses derived from brick upwards to porcelain. If these varieties are such, that we could not have expected them, from the exceeding simplicity of the composition, so is it remarkable that we must depend on nature for the greater number of them, though possessed of the ingredients, and of the means of analyzing these natural compounds. Every one knows how difficult it has proved to rival the porcelains of China, and that the ancient pottery of Greece is hitherto inimitable.

Indispensable as this property, and the arts derived from it, are to those countries which are deprived of stone, which, nevertheless, from this very cause, their alluvial nature, with their consequent fertility, have been the earliest and most crowded seats of civilized man, so is it in those that the substances in question abound most, as the art of converting them into stone seems coeval with man himself. Still more remarkable may it be considered, that in the most ancient and noted of all inhabited lands, the clay deposited by its great river is convertible into brick by the mere power of the sun, without which peculiar appointment and command Nineveh and Babylon would scarcely have been; while these great cities occupy a space and a time far too important in the history of man, to permit us to doubt that they were ordained,—they, and the very means of their erection and existence. On so apparently insignificant a property in an insignificant earth, the refuse of the mountains, the produce of apparent casualty, the deposit from a river breaking its seemingly appointed bounds, have been founded the greatest and the most powerful, as the most ancient of empires, producing all those extraordinary consequences which, but for this, would never existed. Can the hand of the Creator be seen in this? Let the reader conclude for himself.

On the variety of arts, the mass of industry, the production of wealth, the uncountable uses consequent on so apparently trivial a substance and simple a property, I need not dwell. Yet I must remark, that to the singular indestructibility of this artificial stone, a property possessed by scarcely any natural work, we owe, as we do to architecture, much historical knowledge that would otherwise have irreparably perished. Hence alone, nearly, is it that we can still trace the great Babylon, perhaps the remains of that very tower, whose history forms so remarkable an era in that of mankind. To this we long owed the only knowledge we had of a perished written language, perhaps of the language used by the earliest races of man. To this also we owe much of what has been rescued for us in the arts of Greece and Etruria; and thus has one of the most apparently frail, as fragile, productions of human art, become the most unexpectedly durable of the records of nations.

[MACCULLOCH'S *Proofs and Illustrations of the Attributes of God.*]

THERE is something in beauty, whether it dwells in the human face, in the pencilled leaves of flowers, the sparkling surface of a fountain, or that aspect which genius breathes over its statue, that makes us mourn its ruin. I should not envy that man his feelings who could see a leaf wither or a flower fall, without some sentiment of regret. This tender interest in the beauty and frailty of things around us, is only a slight tribute of becoming grief and affection; for Nature in our adversities never deserts us. She even comes more nearly to us in our sorrows, and leading us away from the paths of disappointment and pain, into her soothing recesses, allays the anguish of our bleeding hearts, binds up the wounds that have been inflicted, whispers the meek pledges of a better hope, and in harmony with a spirit of still holier birth, points to that home where decay and death can never come.—*Constantinople.*

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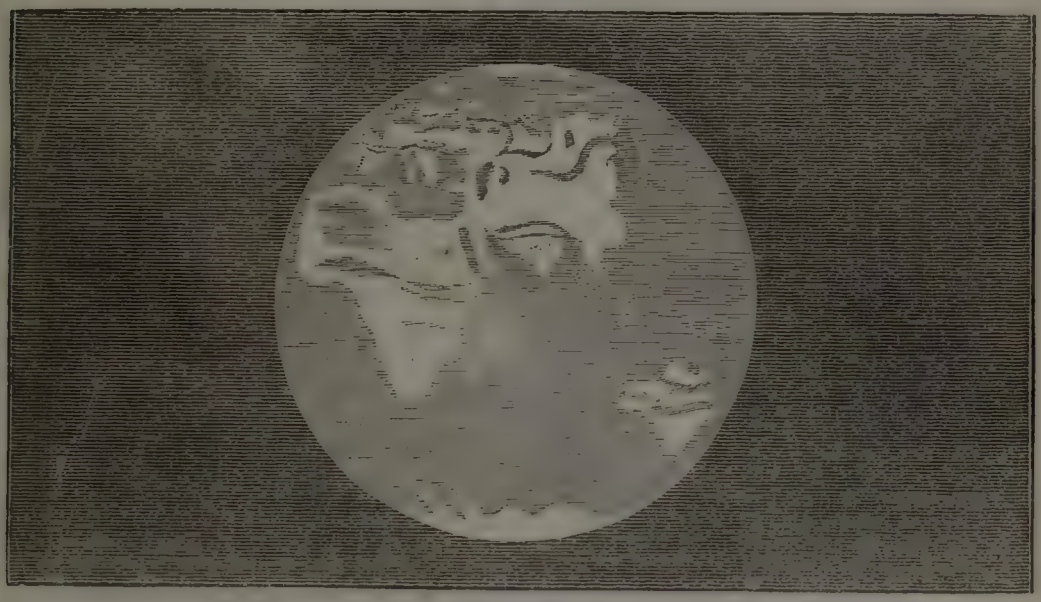


THE PROBABLE APPEARANCE OF THE EARTH TO THE MOON.

THE EARTH.

. . . . . What if the Sun
Be centre to the world, and other stars
By his attractive virtue and their own
Incited, dance about him various rounds?
Their wandering course now high, now low, then hid,
Progressive, retrograde, or standing still,
In six thou seest, and what if seventh to these
The planet Earth, so steadfast though she seem,
Insensibly three different motions* move?
MILTON'S *Par. Lost*, b. viii.

We have now arrived at the third planet in the order of distance,—the Earth, on which we dwell: that habitation which, though it may appear so vast—so mighty—to our gaze, is but a speck in the great scheme of the universe. Could we but travel into space, and view the solar system as a connected whole, how small would our Earth appear, and how unworthy of the boastful importance which we are apt to attach to it! If there be inhabitants on any of the exterior planets, they see the Earth merely as a small star, shining by the light which she receives from the Sun, and which she reflects from her own surface.

That the Earth is round the proofs are many and easy: for, in addition to the gradual appearance, from the top downwards, of a ship coming into port, and the fact of the world having been sailed round, which amounts to practical conviction,—yet, as this sailing has always been in the direction of East and West, the Earth might be cylindrical, and this Eastern and Western circumnavigation still have taken place; but, in sailing southward, we observe that the fixed stars in the Northern heaven sink down towards the horizon, and the Southern stars keep on rising in the sky; the reverse taking place as we return northward. This circumstance is beautifully alluded to in the *Lusiad* of Camoëns, a Portuguese poem, relating to the discovery of India.

O'er the wild waves as southward thus we stray,
Our port unknown, unknown the watery way;
Each night we see, impressed with solemn awe,
Our guiding stars and native skies withdraw:
In the wide void we lose their cheering beams:
Lower and lower still the Pole-star gleams,
Till past the limit, where the car of day
Rolled o'er our heads, and poured the downward ray,
We now disprove the faith of ancient lore;
Boötes' shining car appears no more:
For here we saw Calisto's star retire
Beneath the waves, unawed by Juno's ire.

The latter part of this quotation implies, that when the navigators had got some way below the tropic of Capricorn, they lost sight of the constellations Boötes and the Great Bear.

The Earth, however, like all the other planets, is not quite of a globular shape; and, before we proceed further, it may be desirable to explain why it is that none of the planets are precisely globular, but are somewhat flattened at two opposite sides, into a shape which is called an oblate spheroid, but which will be sufficiently comprehended, if we compare it to an orange.

All the planets, besides revolving round the Sun, have, as we said, a revolution on their own axes; that is, they spin round like a top. What may have been the original cause of this motion has never been discovered. We can only conclude that it was given to those bodies by the great Creator, for his own wise purposes, and according to his own fixed and inscrutable decree. Hidden as the cause of this motion is from us, we can, however, trace its effects in many important circumstances; one of which is, the oblateness, or flattening of the revolving bodies. There is a kind of force called *centrifugal*, occasioned whenever a spinning round is performed: this force tends to throw the body, or anything which rests upon that body, away from the centre as far as possible, and may be illustrated in a variety of ways. A pail of water may be suspended by a rope, and turned rapidly round in a vertical circle without wasting a drop of the water; although in every revolution, the pail, and the water which it contains, strive to recede from the hand, which is the centre of motion, as far as possible, during the revolution, by virtue of the *centrifugal*, or *centre-flying* force, which is imparted to them in proportion to the rapidity of motion. When the pail is upside down, the natural tendency of the water is to be poured out towards the ground; but this tendency is counteracted by the centrifugal force, which tends to drive the

* The annual, diurnal, and libratory motions, explained in this paper.

water away from the central force which retains it. It is on a similar principle that a slinger propels a stone to a great distance: the hand is the centre of motion; and he turns the stone rapidly round in order to gain for it a centrifugal force, which shall carry it to a great distance, as soon as it is released. If we drive a wire through any round body, and make the surface of this body equally wet all over, and then spin it round by means of the wire, the moisture will be collected in greater quantity at those parts of the surfaces most removed from the wire; while, at the parts near the wire, the quantity will be diminished: the centrifugal force urges the fluid away from the central part to the part furthest removed from the wire; which part describes the largest circle in going round.

Now, the same line of argument will apply to a revolving planet: the surface of the Earth moves round its axis (an imaginary line, the extremities of which are called its *poles*,) with a velocity of 1042½ miles per hour, at the equator, a line supposed to be drawn all round the globe, at an equal distance from the two poles and at right angles with the Earth's axis. It is clear, therefore, that the velocity of the rotation of any part of the Earth's surface must diminish as we recede from the equator and approach the poles. But, as the equatorial parts especially, acquire such a vast centrifugal power, the effect of it is, that the Earth bulges out at those parts most removed from the axis of rotation. The extent, to which this bulging has been carried in the case of the Earth, during the lapse of nearly sixty centuries, will be seen from the following dimensions:—the smaller diameter of the Earth, measured along the polar axis, is 7899 English miles; and the greater diameter, which is the diameter of the equator, is 7926 miles, which, therefore, exceeds the other by about twenty-seven miles: if we take the average of these two diameters, we may say that the Earth's diameter is about 7912 miles; consequently, the circumference of the Earth amounts to 24,899 miles.

Our planet, when in *perihelion*, that is, at *its nearest point to the Sun*, is about ninety-three millions of miles distant from the Sun, and about ninety six millions of miles distant therefrom, when in *aphelion*, that is, *the point furthest removed from the Sun*. These two terms will be understood by referring to the ellipse, or oval, which was represented in our first paper: the Sun is situated, not in the centre, but in one focus of the ellipse; and when the Earth is nearest to the Sun's focus, she is said to be in *perihelion;* when farthest therefrom, in *aphelion*. Hence, its average distance from the centre of its annual motion, is about ninety-five millions of miles.

The path, which the Earth describes round the Sun, is, therefore, an orbit of about six hundred millions of miles; and this enormous distance she traverses at the rate of 68,000 miles an hour, or about nineteen miles in a second, in 365 days, 5 hours, 48 minutes, and 49 seconds, being the period to which we give the name of *year*. If the Earth did not revolve on her axis, we, who inhabit its surface, should see the Sun apparently making a revolution round the Earth in the course of a year: a revolution which, however, would be altogether imaginary, owing to the fallacy of the evidence of our senses. The Earth moves in her orbit; but we cannot see that it is moving, because we are on its surface, and are moving in a like direction, and with a like velocity. The motion of the Earth is of a smooth, equable, and unimpeded kind; which sort of motion, if we experience anything like it by land or water, our senses may be lulled into a forgetfulness of our being carried along, while the stationary objects on either side,—the hedges, trees, banks, &c.,—seem endued with motion, and glide rapidly past us. If this be the case with respect to the annual motion of the Earth round the Sun, how much more forcible is the application of this analogy to the diurnal motion of the Earth on her axis! The Sun, the planets with their moons, the comets occasionally, and innumerable fixed stars, are placed in an apparent hollow sphere around us; and as we come opposite to different parts of the heavens in succession by our diurnal rotation, it appears to us as if the whole of this concave sphere kept on revolving round our Earth.

The term of a *year*, just spoken of, is the time taken up by the Sun in passing, apparently, from a particular point of the ecliptic to the same point again: say, the first point of Aries, being one of the two points, where the equator and ecliptic cut each other. This is called the *solar*, or *tropical* year, the time it takes the Sun to visit the tropics and return to the equator; whereas, the time taken up by the Sun, in passing from a certain fixed star to the same star again, consists of 365 days, 6 hours, 9 minutes, and 12 seconds, and is called the *sidereal* year; the year as determined by observation of a particular star. This latter is twenty minutes, twenty-three seconds, longer than the former; and is owing to a slow, but constant, alteration of the position of the equinoctial points.

The actual time in which the diurnal revolution of the Earth is completed, is 23 hours, 56 minutes, and 4 seconds; but, owing to the motion of the Earth in her orbit at the same time, it is twenty-four hours, upon an average, throughout the year, before the Sun can pass from the meridian of a place to the same meridian again. This meridian implies a line drawn from North to South, going through any particular place, to which line the Sun becomes vertical every day at noon.

The axis, on which the Earth is supposed to revolve, is inclined to the plane of the Earth's orbit, or ecliptic, at an angle of about 66½ degrees. Now, as the plane of the equator is perpendicular to the axis of the earth, it follows that the plane of the equator is inclined to the plane of the ecliptic at an angle of about 23½ degrees. Very remarkable and important effects result from the rotation of the Earth on her axis, and from the obliquity of the equator with the ecliptic, which effects will occupy our attention more particularly in the next paper.

We have already seen that the Earth is not now a perfectly geometrical globe; and it would strike us that, if there were no other cause to interfere with its due form, the existence of mountains and valleys on its surface is sufficient to disturb the tiny conception we have at first regarding

> This pendant world, in bigness as a star
> Of smallest magnitude close by the moon.
> MILTON'S *Par. Lost*, b. ii.

But our conceptions of the extent of the earth's surface, which are contracted when we compare the Earth with the universe, become enlarged by referring it to ourselves. Hence, by instituting an arithmetical comparison between the Earth and a globe of eighteen inches diameter, if we wished to form at its proper place on the latter, and in its proper proportion, the very highest mountain in the world, which is the Chumularee, belonging to the Himalayah range, in Asia, and 29,000 feet in height, the elevation on the artificial globe would be about the one-fiftieth of an inch.

It is probable that the Earth serves, only in a more efficient manner, the same purpose to the Moon that the Moon serves to the Earth; undergoing all the changes which we see in the Moon, and appearing nearly thirteen times larger, and consequently much more brilliant. Its appearance to the Moon is represented at the head of this paper. This representation is, of course, fanciful; and to estimate it fairly we must indulge ourselves in the supposition that the lunar inhabitants, if there be any, are, for the most part, in similar circumstances with ourselves.

We have before stated that the diameter of the Sun is 111 times as great as that of the Earth. Now this proportion makes the solar globe to be, as a whole, 1,381,472 times as large as the globe of the Earth; though the density of the latter is about four times as great as that of the former. The average density of the Earth is 4½ times that of water: so that it would seem that the Sun is composed of matter somewhat more dense, or consistent, than water.

THE MOON.

> .....Meanwhile the Moon
> Full orbed, and breaking through the scattered clouds,
> Shows her broad visage in the crimsoned East.
> Turned to the Sun direct, her spotted disk,
> Where mountains rise, umbrageous dales descend,
> And caverns deep, as optic tube descries,
> A smaller Earth, gives us his blaze again,
> Void of its flame, and sheds a softer day.
> Now through the passing cloud she seems to stoop,—
> Now up the pure cerulean rides sublime.—THOMSON.

When the poet wrote these beautiful lines, we can imagine, from the context, that he was under the influence of those feelings, which are produced in men by the aspect of the quiet, moon-lit scene of nature; when the tumults, excited by day, and the passions roused by intercourse with fellow-mortals, are becalmed by the clear, cold, silence, which pervades the open country; such as makes melancholy have something of a pleasing turn, when we love to walk forth—

To behold the wand'ring Moon,
Riding near her highest noon,
Like one that had been led astray
Through the heaven's wide pathless way,
And oft, as if her head she bowed,
Stooping through a fleecy cloud.—MILTON's *Il Penseroso*.

We will consider chiefly the circumstances which relate to the Moon as a celestial body, independant of the Earth.

The Moon is about 2060 miles in diameter; that is, her diameter is rather more than a quarter of that of the Earth, which is about fifty times the size of the Moon. Her mean distance from the Earth, as calculated from her horizontal parallax, is almost 240,000 miles; and she moves in her course round the Earth at the rate of about 2290 miles per hour.

The Moon shines by reflecting the Sun's light, as first supposed by Thales, the Grecian astronomer. Plato supposed that it was composed of fire; and Aristotle, that it shone by its own native light. The Moon's light has been found, as far as our means of observation extend, to be quite devoid of heat. This fact has been proved by concentrating 306 times the rays of the full Moon, when on the meridian, by a powerful burning-glass of three feet in diameter; the focus of which rays has not affected the most delicate thermometer. It has been shown by experiment, that the light of the Sun is 300,000 times greater than that of the Moon. Now we will suppose that the heating power of the Sun, compared with that of the Moon, is in the same proportion. The direct rays of the Sun are capable of elevating the thermometer 237°. The Moon's beams would therefore raise the thermometer, according to this calculation, only $\frac{1}{1\frac{1}{2}0}$th of a degree; and, if these moon-beams were concentrated 306 times, the elevation of the thermometer might be $\frac{1}{4}$ of a degree. But, even this calculation is considered to be too favourable to the heating power of the moon-beams, and cannot be borne out by experience.

The Moon, then, not possessing any heating rays, that are cognizable by man, does not seem likely to possess or exert any influence over the herbs, flowers, and other productions of the earth, as was imagined by the old botanists. We read in the 33rd chapter of Deuteronomy, verse 14, where Moses, the Jewish lawgiver, speaks of the blessings of Joseph, that he refers to "the precious fruits brought forth by the sun, and the precious things put forth by the moon." We ought to observe that, in the original Hebrew, the word *moon* is used in the plural number; and in the next place, commentators have offered two senses of the latter phrase:—first, it may imply the productions of the ground made to spring up by the dews, which descend at night, when the Moon is visible; or, secondly, we may understand the productions of the earth, which appear respectively in their different *months*, or *moons*; the former of these two words being only a derivation of the latter.

The inclination of the Moon's axis to the plane of the ecliptic is only about $1\frac{1}{2}°$; so that her seasons are permanent and without variety. The density of the Moon is considered to be somewhat greater than of the Earth.

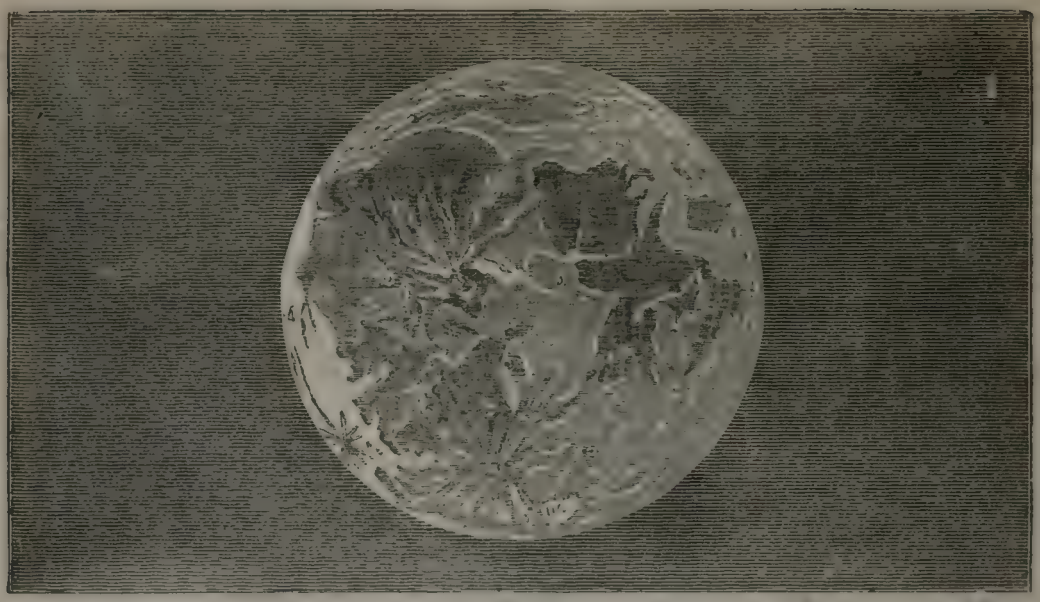
The Sun and the Moon have always attracted the attention of mankind more than the other celestial bodies, owing to their greater apparent size, and direct influence upon our globe. The Moon, revolving round the Earth, is called the Earth's *satellite*, or *attendant*. When the full Moon is viewed through a powerful telescope, her illuminated surface appears interspersed with dark spots and ridges, of every variety of shape, as represented in the subsequent figure; which kind of representation of the Moon was first sketched out by Hevelius, in the year 1645.

There are valleys, or hollows, which are supposed to be three miles deep, and are surrounded by nearly circular margins, a phenomenon to which the Earth cannot afford a parallel. The spots have been so carefully noticed, that a catalogue of 89 of them has been prepared, in which a description of the form and appearance of each spot, and of its exact position on the Moon's surface, is given. The spots have had fanciful names applied to them,—sometimes they have been named after distinguished individuals, while at other times they have been named after certain places on the Earth's surface, such as Byzantium, Caucasus, Sogdiana, &c. The heights of the mountains, which have been observed on the Moon's surface, are very variously stated by different authors, according to the modes in which the observations were made:—one of these modes was to measure the lengths of the shadows, cast by the mountains, in consequence of the light of the Sun coming in a particular direction, the shadows being then compared with the whole diameter of the Moon. The bright spots are held to be the tops of lofty mountains illumined by sunshine; two or three of which Dr. Herschel observed to be of a volcanic nature, and to emit flames and smoke. The best authorities make the highest of these mountains less than two miles in height. Generally speaking, the dark parts are thought to be water, and the bright parts land; the former absorbing, and the latter reflecting the solar rays: while, at the same time, many astronomers think that there is not much water in the Moon, owing to the usually serene appearance of her disk, which seems free from clouds and undisturbed by fogs and vapours. If there be little or no water in the Moon, this circumstance may account for the vast hollows just spoken of; which sort of appearance the Earth might present if the oceans and lakes were suddenly drained off. But, in respect of the details of the surface of the lunar globe, there exists much variety of opinion among astronomers.

The Moon is presumed to have no atmosphere, or one which is of a very thin character, because there have not yet been observed any effects of refraction, whereby the forms of planets, when being *occulted*, that is, passed over and *hidden* by the Moon, would appear distorted just before the act of occultation. This effect would result from the star or planet being seen through the Moon's atmosphere. But there does not seem an universal opinion among astronomers on this point; as several have recently given accounts, which, if correct, would lead us to conclude that there was a lunar atmosphere; while others say decidedly that there is not: it seems, however, to be agreed that the atmosphere must be of a very rare character.

The Moon revolves in her orbit round the Earth at the same time that the Earth itself is revolving about the Sun: the consequence of which is, that the Moon traces a sort of spiral line round the Sun; because, by the time the Moon has made one revolution round the Earth, the Earth has performed nearly one-twelfth part of her annual circuit round the Sun. The Moon goes round the Earth about $12\frac{1}{2}$ times in the course of a year; and the actual time taken up by the moon in performing this circuit is about $27\frac{1}{3}$ days; but the time from new moon to new moon again is about $29\frac{1}{2}$ days. To each of these periods of time has been given the name of *month*; the former being called *periodical*, comprising the *period* of the Moon's course round the Earth; the latter *synodical*, or the month, as agreed upon by men in the infancy of society, and determined by *the coming together* of the Sun and Moon. The reason why the latter is longer than the former is, that, although the Moon might actually pass round the Earth in $27\frac{1}{3}$ days, if the Earth were still; yet, a longer time is consumed from one phase of the Moon to the same phase again, owing to the motion of the Earth in its orbit, in the same direction as the Moon's motion, from west to east; so that the extra $2\frac{1}{4}$ days are spent by the Moon in fetching up the overplus of the progress made in the mean time by the Earth.

The Moon revolves on an axis, and it is remarkable that the time of this revolution is just equal to the time which she takes to revolve round the earth; a consequence of which is, that the Earth always has the same side of the Moon presented to it. The inhabitants, if any, on this side the Moon have the Earth always before them, while those on the remote side of the Moon can never be blessed with the view of it. The disk, which the Earth must exhibit to the inhabitants of the Moon, having a diameter nearly four times as large as the Moon's, is more than twelve times as large as that which the Moon offers to the Earth. The Earth must, of course, rise and set to the Moon, and go through the various phases of light, just as we see is done by our celestial attendant, owing to the motion of the Moon round the earth; otherwise, the Earth will appear fixed in the heavens, relatively to the stars, because the earth is the centre of the Moon's motion. The Earth too would turn on its axis nearly thirty times, while the Moon is moving once round,—a rapidity which must seem astonishing to the Lunarians. The phases exhibited to the Moon by the Earth, must be always the reverse of those exhibited at the same time by the Moon to the Earth, as will be evident from inspecting the subsequent diagram. We may imagine what must be the feeling of intense curiosity with which those on the further side of the Moon seek for information concerning the splendid orb, visible to the other lunar hemisphere. Suppose now that we, in England, were to hear of a splendid moon, of vast dimensions, being visible to the



THE MOON.

inhabitants of the Sandwich Islands or New Zealand, and that we ourselves were without a moon, how eagerly would our navigators and travellers look out for the brilliant visiter, when they arrived at the line on the Earth's surface at which this spectacle became visible! At all seasons of the year, we see the Sun and also the Moon; this arises from the circumstance, that although the Earth revolves on her axis, yet the time which she takes in that rotation is neither that which she takes to revolve round the Sun, nor that which the Moon takes to revolve round the Earth. This is a striking instance of the great effects which often result from what we should, at first sight, deem slight causes. We know not whether any living beings inhabit the surface of the Moon; but if such be the case, they must be divided into two portions, very unequally favoured, as regards the view of the Earth, one portion having it always in sight, while to the other portion the Earth is altogether invisible.

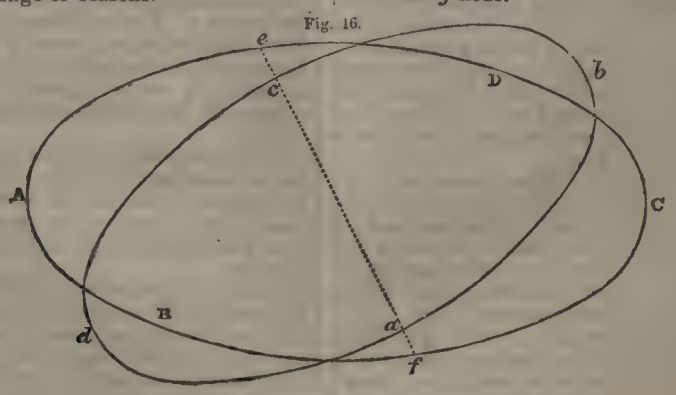
From the foregoing statements it will be seen, that one day and one night are completed to the inhabitants of the Moon during one of her revolutions round the Earth. Hence the lunar day and night must be each as long as 14¾ of our days. One side of the moon must have the full glare of the Sun's light and heat, almost unmitigated; the lunar atmosphere, if there be any, being very rare, and, therefore, not holding clouds suspended in it, while the contrary side of the Moon is enveloped in almost profound darkness and intense cold; this must especially be the case at that side of the Moon which the Earth never sees. From this will result, also, the lunar summer and winter, coincident with the lunar day and night; for such must be produced merely by the Moon's rotation on its axis, the inclination of this axis to the ecliptic being, as we said, so small as to produce no change of seasons.

Though, as was before said, we see only one side of the Moon, yet there is occasionally seen somewhat more than an exact hemisphere, which effect is termed *libration*, a word implying a *poising*, or *oscillation*, of the body of the Moon, owing to certain disturbing causes.

When a little of the further side of the Moon on either side is seen, owing to the irregularity of the Moon in her orbit, by reason of the attractions of the Sun and the Earth, this effect is termed the Moon's *libration in longitude;* and when, owing to the Moon's axis not being quite perpendicular to her orbit, a little of the further side of the Moon is seen at either of her poles, this effect is called the Moon's *libration in latitude.* Owing to the causes which produce these effects, the Moon's motion is the most irregular and complicated of any of the celestial bodies. Moreover, we do not exactly see the same face of the Moon when she is in the horizon as when she is in the zenith, which difference is termed *diurnal libration.*

The orbit of the Moon is inclined to that of the Earth, or the ecliptic, at an angle of about 5°; and the points, where these orbits cut each other, are called *nodes*, from the Latin *nodus*, a *knot.* This observation applies likewise to all the planets in their crossing the ecliptic, or orbit of the Earth. The Moon and the different planets are *above* the orbit of the earth, during one-half of their orbital revolutions, and *below* the Earth's orbit during the other half. In the annexed diagram let ABCD represent the ecliptic, and *a b c d* the orbit of Mercury. The dotted line *e f* is called *the line of the nodes*, because it passes through those parts of the respective orbits which cut each other, or are on a level with each other, which level is *e c a f.* The planet, in moving round from west to east, goes in the direction *a b c d; a* is, therefore, called the *ascending* node, *c* the *descending* node.

Fig. 16.



THE NODES OF A PLANET.

The word *disk*, so frequently used in reference to the Sun and Moon, implies a flat circular appearance, such as is presented by the Sun, Moon, and other heavenly bodies, when magnified; it is derived from the Greek word for *hurling*, the disk being a flat circular piece of metal, used in this exercise; we call it a *quoit.*

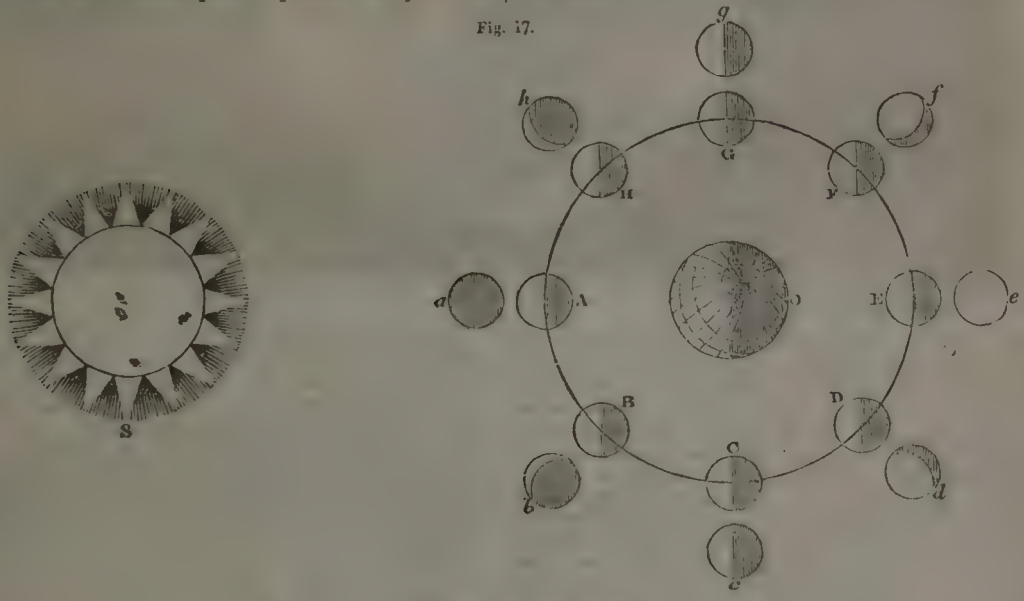
We shall now notice in order those phenomena presented by the Earth and Moon, which are dependant on their relative positions conjointly with the Sun: these may be considered as of three kinds; 1st, the Phases of the Moon; 2nd, Eclipses of the Sun and Moon; 3rd, Tides.

I. PHASES OF THE MOON.

We have already stated, in general terms, the reason why an opaque body, such as a planet, must necessarily exhibit phases similar to those of the Moon. We may here add, that this observation applies especially to bodies whose orbit is within, or next to, that of the Earth. The planets Mercury, Venus, and Mars have been found to exhibit phases. The more distant planets present always a full face, owing to the great scope of their annual motions. The phases of the Moon, our nearest neighbour in the sky, are, however, so extremely interesting as a phenomenon, which bears reference to the Earth, that we deem it desirable to present in this place a figure illustrative of its causes and nature.

Let us imagine that S represents the Sun (supposed to be at a great distance off), that O represents the Earth, and A B C D, &c. the Moon at different parts of her orbit round the Earth. We will assume, in the first instance, that the moon is at A; in this position it will be perceived, that the enlightened half of the Moon is turned completely away from the Earth, while the dark half is presented towards the Earth.

Fig. 17.



PHASES OF THE MOON.

This results from the principle, that only one half of a globular body can be illuminated at one time, by a light proceeding from only one source; as, therefore, the illuminated half of the Moon is directly towards the Sun, and the dark half towards the Earth, it follows that an inhabitant of the Earth cannot see the Moon at all; this fact is represented by the black circle *a*, and whenever such is the case, the moon is said to be *new*, or in conjunction.

In about three and a half days from this time the Moon will have moved round in her course to the position B, which is called the first octant, or the first eighth part of her orbit. In this position the enlightened side is, as before, towards the Sun, but the dark side is not turned directly towards the earth; the inhabitants of the Earth see the Moon at some distance on the eastern side of the Sun, and the consequence of this is, that they catch a glimpse of the Moon's illuminated part. The illuminated part thus observed, presents the appearance of a crescent, and is represented by *b*. The points of this crescent are called the Moon's *horns*, or *cusps*; the latter word being derived from the Latin *cuspis*, a *point*. If we take note of the day on which a new moon occurs, as stated in an almanac, and watch for the actual appearance of the Moon about three days afterwards, we shall find that it presents the form of a luminous crescent, convex on one side and concave on the other, and, moreover, that the convex side is invariably turned towards the Sun.

After passing that position the Moon travels on to the position C, when she is said to be in quadrature,—that is, she has performed a quarter of her revolution round the Earth. In this position it will be found, that one half of her illuminated surface is visible to an inhabitant of the Earth, or that she appears as a semicircle as at *c*; this occurs in about a week after her conjunction.

Proceeding in her orbit she arrives at the position D, which is so far removed from the position A, that nearly the whole of the illuminated surface is visible to the Earth, at O. In this position the Moon is at her second octant, and presents an appearance such as *d*, in which about three-fourths of her illuminated surface is visible. This is the gibbous phase. The word *gibbous* is derived from a Hebrew word, implying *prominence* or *convexity*.

In another period of about three and a half days, we find the Moon in the most favourable position for being viewed from the Earth. This position is at E, which is on the further side from the Sun, which illuminates, as before, one half of the Moon's surface, and that half is visible to the Earth at O. The Moon is now *full*, or in opposition; and its appearance, as viewed from the Earth, is a luminous circle as *e*.

After this period the Moon begins to wane, or to diminish in the apparent extent of its illuminated surface. When she reaches the position F, she presents to the Earth the same amount of illuminated surface as at D; but the flattened, or imperfect edge, is turned somewhat round, so as to maintain its constant character of being away from the Sun. Its appearance to the eye is represented by *f*. This is the third octant.

Shortly afterwards it attains that position which is termed the last quarter, and which is represented at G. Here the general resemblance is to the position C, when the Moon was in the first quarter; and it is represented, as seen by the eye, at *g*. The last octant is at the point H, when the Moon has performed seven-eighths of her orbit round the Earth, and her appearance is that of a faint crescent of light as at *h*, which is equal in extent and brilliancy to the crescent *b*, which she presented about three weeks previously.

From this point she proceeds again to the point A, when she becomes again invisible to the Earth, on account of her illuminated surface being turned wholly away from the Earth: she may again be represented by the black circle *a*, and again obtains the name of New Moon, and is in conjunction.

Thus it appears that the different phases, or appearances of the Moon, admit of being satisfactorily explained on the two-fold principle, that she is an opaque body, reflecting the Sun's light, and that she revolves round the Earth from New Moon to New Moon. It is necessary here to observe, that although we are in the habit of considering the full Moon as a perfect circle, or disk of light, it is not so in reality. When we see the full Moon, she is either raised a little above, or depressed a little below, the straight line joining the Sun and Earth, and, therefore, there is a

small portion of her illuminated surface lost to, or turned away from, the Earth; this portion is at the upper part, when the Moon is above the line of which we have spoken, and at the lower part when she is below that line. When, however, the Moon is exactly in the direction of this line, or, in other words, when the Sun, the Moon, and the Earth are all in one straight line, some very remarkable effects are produced, which, under the name of *Eclipses*, have attracted a large share of attention in all ages. The principle is similar to that which we alluded to, in the case of the transits of the inferior planets; but when the Sun, Moon, and Earth are all concerned, the effects are more imposing upon the mass of mankind. In proportion to the ignorance of the cause of any operation of nature, is the amount of speculation and alarm respecting the effects. Among the nations of antiquity the occurrence of an eclipse was sufficient to suspend the rage of battle, the heat of intestine discord, and most of the common operations of life. The superstition of the ancients referring the apparent changes in their deities, Sol and Luna, to their own conduct, they betook themselves to prayer and sacrifice to appease the offended gods; and when the eclipse had passed away, they believed the celestial powers to be propitiated.

By the introduction of Christianity many of the absurd notions of this sort held by the ancients were dispelled, or greatly modified; but yet, until Astronomy was well understood, the fear of something supernatural constantly haunted the great bulk of mankind, believing, as the savage races of mankind do now, that when the motions of these three celestial bodies bring them into a line, the Sun

> . . . . . From behind the moon
> In dim eclipse disastrous twilight sheds
> On half the nations, and with fear of change
> Perplexes monarchs.—MILTON'S *Par. Lost*, b. i.

The phenomena of the heavens have often been resorted to by designing men, to impose upon the credulity or fears of the unintellectual part of mankind. We read that Columbus, when in the island of Jamaica, in the year 1503, was reduced by dread of famine to resort to an imposition of this sort to procure provisions. Columbus and his crew, having been wrecked, had consumed their small stock of provisions, and having to depend upon the natives, with whom many untoward circumstances had prevented them from being upon good terms, it struck Columbus, who had a great knowledge of Astronomy, that an approaching eclipse of the Moon might serve his purpose of awing the natives. He accordingly summoned their chiefs to a council on the evening of the eclipse, and told them that the deity of the skies, whom they served, was angry with the Indians for withholding provisions from the Spaniards; that the Indians would be punished in a signal manner; in token whereof the full Moon, then riding in majesty across the celestial dome, would be deprived of her light, and held in black durance. Some treated this announcement with contempt, while others were alarmed, but all were naturally anxious. When they at length saw the black shadow of the Earth seizing the Moon within itself they were all horror-struck, and, hastening to the crew with provisions of all sorts, they begged the intercession of Columbus with the celestial deity that the Moon might be restored, promising to serve Columbus faithfully ever after. Columbus, after retiring for some time to consult the deity, as he said, promised them that the curse would be taken off from them; and that, as a sign, the Moon would emerge from her confinement; which, when the Indians saw again traversing the heavens, they adored the astronomer, believing him to have supernatural gifts, and to hold an intercourse with heaven, whereby he was informed of what would take place in the skies. The Spaniards suffered no more upon this occasion through famine.

It appears that some of the earliest efforts of astronomers were directed to the prediction of eclipses: how far the power of predicting the occurrence of an eclipse was really possessed by the early Chinese, Hindoos, and Chaldæans, seems to be a matter of much dispute among the learned; sufficient evidence remains, however, to show that extraordinary attention was bestowed upon these phenomena. To attempt to explain the manner in which the astronomer is enabled to predict the return of an eclipse, would be altogether foreign to our present purpose; but we shall endeavour to show in what way the obscuration of light, which obtains for the phenomena the name of an *eclipse*, takes place.

II. ECLIPSES.

THE first point to which we must direct our attention is this:—Why does not an eclipse take place at *every* New and Full Moon? The answer to this is, because the Moon's orbit is inclined to the Earth's orbit; that is, the Moon, in moving round the Earth, does not keep in the same plane as that in which the Earth moves round the Sun. The two planes are inclined to each other at an angle of about 5½°, so that in one part of her orbit, the Moon is above the place of the Earth's orbit, and in another part she is below that plane. Now, it is obvious, that only at the times she is in either of her nodes is she in the plane of the Earth's orbit.

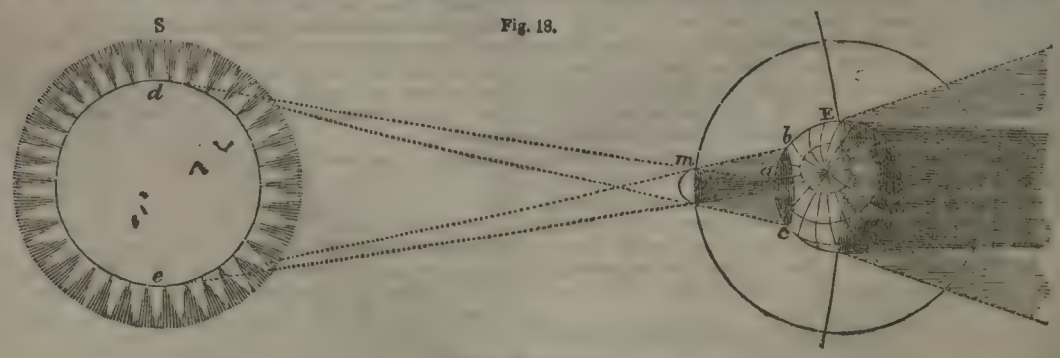
Hence it is only when the Moon is *at* or *near* one of her nodes, at the time of New or Full Moon, that an eclipse can happen; so that, if she be far removed from her nodes at New or Full Moon, she is altogether above or below the line which joins the Earth and the Sun; but if she be exactly at the node, there will be a *central* eclipse, and if she be within certain limits on either side of one of her nodes, there will be a *partial* eclipse.

SOLAR ECLIPSES.

THIS being premised, we are in a condition to understand the phenomenon of an eclipse of the Sun, to which we shall now more particularly give our attention. Let s (figs. 18 and 19), represent the Sun, E the Earth in its orbit, and *m* the Moon in conjunction. A circle surrounds the Earth, which may be considered to represent the Moon's orbit. If the Moon were not present, exactly one-half of the Earth's surface would be illuminated by the Sun; but an obstruction to the Sun's light is offered by the Moon interposing. We have, therefore, the Moon *m* between the Earth and the Sun, and at or near one of her nodes; so that she is not only in the same vertical plane as the Earth and the Sun, but in the same right line with them. If they be not precisely in the same right line, as shown in our figures, there may, at any rate, be a *partial* eclipse of the Sun, if the Moon be within 17° 21′ of her node at the time of conjunction, or new moon.

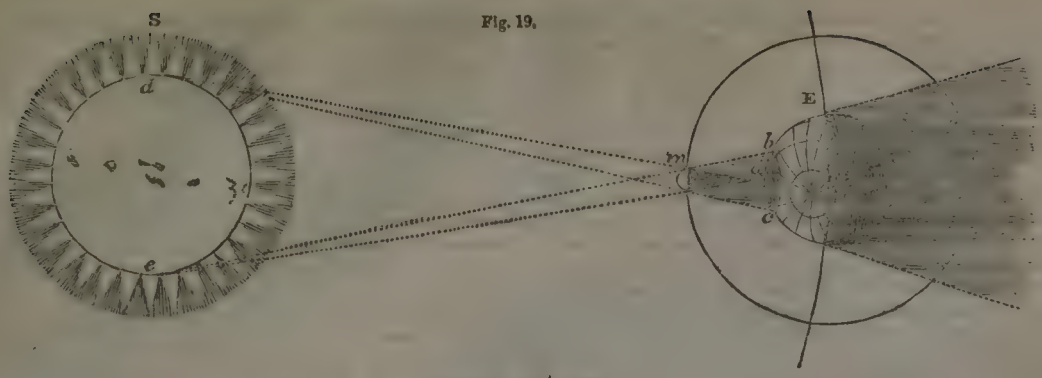
Now, when we hold a ball before a candle, not only is there one half of the surface of the ball in darkness, but there is a long shadow behind the ball, occasioned by the interruption which the ball presents to the free progress of the light in that direction. If we hold a second object in this shadow, we cannot see it by the direct light of the candle; the view which we may obtain of it being by light reflected from other parts of the room; and if we were in a

Fig. 18.



TOTAL ECLIPSE.

Fig. 19.



ANNULAR ECLIPSE.

large open space where no objects were present to afford this secondary reflection, we should find the object immersed in the shadow to be almost entirely invisible. Reasoning thus in the case of the Moon and the Earth, we find a strict analogy: a flood of light is shed by the Sun on the Moon at *m*, by which its front surface is wholly illuminated, and its hinder surface kept in the shade: there is also a shadow cast behind the opaque body of the Moon, the extent of which shadow depends conjointly on the sizes of the Sun and Moon and the distance between them. This shadow is of two kinds, the *umbra** and the *penumbra*; the former being the darker of the two: the reason of this difference is, that the umbra covers a portion of space wholly deprived of the Sun's light, while the penumbra covers that portion of the Earth's surface which has a view of *part* of the Sun's disk. Were the Sun but a luminous point, this distinction would not occur; but, as he has a very considerable diameter, and the Moon is very small compared even with the Earth, it follows that there will be no eclipse to places out of the penumbra; that places in the penumbra will have the Sun partially eclipsed; and that places in the umbra will see a total, or an annular, eclipse of the Sun; the latter depending upon the distance of the Moon from the Earth. The first of the two foregoing figures represents a *total*, the second an *annular* eclipse.

The Moon *m* being exactly between the Earth and the Sun, throws her dark conical shadow *m a* towards the Earth, which shadow, in the first case, reaches the Earth, and in the second falls short of it.

If now we suppose an inhabitant of the Earth to be situated at the point *a*, (fig. 18,) he would witness a total eclipse of the Sun: he will be situated in the shadow of the Moon, and the body of the Moon will completely hide the Sun from his sight; this will be evident, when it is seen that he will be in the shadow, between the lines *d a*, *e a*. If another inhabitant of the Earth were situated at any point between *b* and *a*, or *a* and *c*, he would see a partial solar eclipse, that is, the black disk of the Moon would appear to cut off a portion of the luminous surface of the Sun. The parts of the Earth beyond *b* and *c*, on either side, are out of the effects of the eclipse: the people beyond *b* and *c* see the whole disk of the Sun, as is plain by observing the direction of the lines *b e* and *c d*.

If the Moon were at a constant distance from the Earth, and the Earth at a constant distance from the Sun, a central eclipse of the Sun would always present the same features to an inhabitant of the Earth; but such is not the case: the Earth is about three millions of miles nearer to the Sun in December than in June, on account of her being at that end of her elliptical orbit which is nearest to the Sun; consequently the Sun appears larger, or subtends a larger angle, at the former period than at the latter. Again, the Moon's orbit round the Earth is likewise elliptical; and although we are accustomed to say that the Moon is about 240,000 miles distant from the Earth, yet, when we wish to determine the distance in different times, it is found that the Moon's greatest distance from the Earth is about 251,000 miles, and her least about 227,000. Now, if the Moon were in *perigee* (that part of her orbit nearest to the Earth), and the Earth were in *aphelion* (that part of her orbit farthest from the Sun), at the time of a central solar eclipse, the eclipse would be total, because the apparent diameter of the Moon, as seen from the Earth, would be greater than that of the Sun. But if the reverse were the case; if the Moon were at her greatest, and the Sun at his least, distance from the Earth, at the time of a central eclipse, then the eclipse would be annular†; that is, a ring of the Sun's light would seem to surround the dark body of the Moon, in consequence of the Sun having at that time a larger apparent diameter than the Moon. These differences would not occur, were it not that the apparent dimensions of the Sun and Moon, as seen from the Earth, are so nearly equal.

Hence it will be seen, by inspecting the second figure, that, in an annular eclipse, no part of the Earth can be enveloped in the Moon's umbra, owing to its not reaching the Earth; and the solar ring can be seen only by that part of the Earth where the umbra would have fallen, if the Moon had been nearer the Earth; that is, under the point *a*, where a straight line would reach which had passed through the centres of the Sun and Moon. The part of the Earth out of this spot, but between *b* and *c*, sees only a partial eclipse, and those beyond *b* and *c* none at all.

In order to obtain some means for estimating the magnitude of an eclipse, the diameter of the Sun or Moon is supposed to be divided into twelve equal parts, called *digits*; so that when it is said that such a number of digits was eclipsed, the meaning is at once known: the Moon was not in a node at the time of the eclipse, the eclipse was therefore partial, not central, and the number of digits indicates to what extent of surface the eclipse advanced.

Calculations have been made as to the longest time that a solar eclipse can be either central, or annular, under the most favourable circumstances; and it has been found that 12 minutes 24 seconds is the longest time of an annular eclipse, and 7 minutes 58 seconds the longest time of a total eclipse.

The periods which the Earth and Moon take to perform their respective revolutions, and the degree of obliquity between their orbits, have enabled astronomers to calculate how many eclipses may occur in a year. There must be two eclipses of the Sun in every year, and the number may be as high as five, but it cannot be greater. No solar eclipse is visible in every part of the portion of the Earth which is turned towards the Sun, because the shadow of the Moon is too narrow to take in the whole diameter of the Earth at once, as may be seen in the preceding figures. A solar eclipse cannot be total at the same moment to a portion of the Earth more than 180 miles in diameter; but it may be partial at the same moment to a portion of the Earth 4900 miles in diameter. We may further observe that a solar eclipse does not happen at the same point of time at all places where it is perceived: it appears earlier to those persons situated towards the west, than to those situated towards the east, because the motion of the Moon and of her shadow is from west to east. Moreover, the extent of solar obscuration is different at different latitudes on the Earth's surface; according as we may suppose a spectator to be more or less distant from the line which connects the three bodies in question.

LUNAR ECLIPSES.

As the solar eclipse was owing to the opaque body of the Moon hiding the light of the Sun from the Earth, and took place when the Moon was new, or in conjunction; so the lunar eclipse is due to the opaque body of the Earth

* *Umbra* is the Latin for *a shadow*; *penumbra* implies *a partial shadow*.

† So termed from *annulus*, the Latin for *a ring*.

hindering the solar rays from reaching the Moon, and takes place when the Moon is full, or in opposition.

In the subjoined figure, s represents the Sun, E the Earth, *m* the Moon in opposition. The Sun, shining upon the Earth, causes a shadow to be thrown behind, which has the form of a cone; that is, it tapers to a point like a sugar-loaf. The reason why the shadow thus tapers to a point is, that the Sun is so much larger than the Earth. The distance of this point, or the total length of the Earth's shadow, is about 840,000 miles, when the Earth is nearest to the Sun; and about 870,000 miles, when she is at her farthest distance therefrom: it follows, therefore, that if any body pass behind the Earth, in a right line with the Sun and the Earth, and not at a greater distance from the Earth than has just been named, that body will be immersed in the Earth's shadow.

This is the case with the Moon: we have seen that she is, on an average, about 240,000 miles distant from the Earth; and that she revolves round the Earth in a plane nearly coincident with the plane of the Earth's orbit. In our figure the shadow of the Earth is represented as having a conical tendency; if now the Moon *m* were beyond the apex of this cone, she would altogether escape from the Earth's shadow, but, as part of her orbit (which is represented by the circle,) is between the base and the apex of the shadow, the Moon is necessarily immersed in the shadow, and we thus have the phenomenon known as an eclipse of the Moon. If the Moon happen to be at one of her nodes at the time of full Moon, then we have a central and total eclipse; but if she be at any part of her orbit not exceeding 11° 21′ from the node, the eclipse will be partial. In this case, the three bodies cannot be in a perfectly straight line; so that the Moon dips more or less of its body into the shadow of the Earth, but not the whole of its body.

Some time before the commencement of an eclipse of the Moon, she is seen to be partially obscured, as if a mist covered the illuminated surface: this arises from the circumstance that she has to go through the Earth's penumbra, or partial shadow, before her immersion in the umbra, or real shadow. In our figure, rays of light from the two extreme edges of the Sun *a a′*, pass by the edges of the Earth *b b′*, (having previously crossed at *c*,) and go on in the direction *b d* and *b′ e*: but still the upper part of the penumbra *d b f*, receives light from the upper part of the Sun, although the Earth prevents it from receiving light from the lower part; and, again, the lower part *g b′ e* of the penumbra receives light from the lower part of the Sun, although the upper rays are also excluded by the Earth. From this circumstance, therefore, the real shadow is surrounded by a partial shadow, which imparts to the Moon the dusky appearance just mentioned, which duskiness becomes more decided as the Moon approaches the real shadow, and so receives fewer rays from the Sun. If there be inhabitants in the Moon, they, of course, see a solar eclipse; and, while they are in the Earth's penumbra, the Sun appears to them partially eclipsed, which solar eclipse increases until the Moon enters into the Earth's umbra; when the Sun appears to the Moon, and the Moon appears to the Earth, totally eclipsed.

By comparing the foregoing circumstances, we find that a solar eclipse can be visible to only a portion of the enlightened hemisphere of the Earth: while a lunar eclipse may be seen by half the globe of the Earth. Moreover, a lunar eclipse always begins on the eastern edge of the Moon, because her motion is from west to east; so that her eastern edge first enters into the shadow of the Earth: but, in the case of a solar eclipse, the dark body of the moon appears first on the western limb of the Sun, on account of the motion of the Moon from west to east, as mentioned in the former case.

During a total, or large partial eclipse of the Sun, the dark side of the Moon is not wholly invisible. We can, therefore, descry its general outline, owing to the Sun's light being reflected strongly from the surface of the Earth to the Moon; and this reflected light is again reflected from the Moon, and constitutes the faint light on her surface seen during a solar eclipse, and also in a very interesting manner, when the Moon is only two or three days old. The disk of the Earth appearing to the Moon nearly thirteen times as large as the Moon appears to us, the light which the Earth gives the Moon must be very great. Now, when the Moon is two or three days old, the Earth appears as a large gibbous figure of light to the Moon; and so we see not only the sun-lit part of the moon, but also the rest of its disk, seeming of a dirty white plaister colour. As the light of the Sun increases upon the disk of the moon, the Earth's light to the Moon wanes, and we no longer notice this appearance.

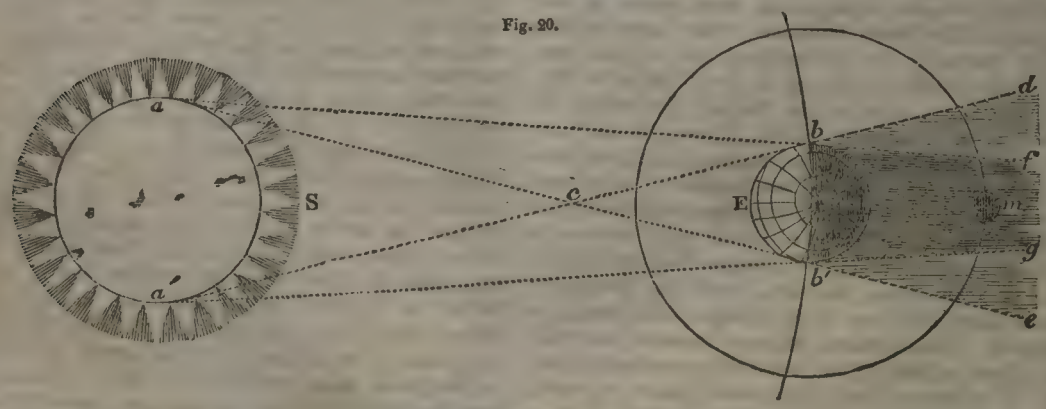
In a total eclipse of the Moon this body is still seen, even when enveloped in the shadow of the Earth, by reason that the rays of light from the Sun are bent round the margin of the Earth by the refracting power of its atmosphere, and are thus carried on through space till they arrive at the Moon; from the surface of which they are again reflected. It is further evident that an eclipse of the Sun cannot be identical as to time and appearance, to any two spectators situated at different points on the Earth's surface; because the sun loses no light, but is only hidden, as it were, by a screen, scarcely, or just big enough to hide it: but an eclipse of the Moon is identical as to time and appearance, because it loses its light, and that too, at a certain precise point of time:—that is to say, we may see the Sun at the time of a solar eclipse, and be ignorant that he is eclipsed; but a lunar eclipse is seen by all, who see the moon.

Hence, though the solar eclipses are more numerous than the lunar, the latter are more likely to be observed, being visible to a whole hemisphere. The usual number of eclipses is about four, two of the Sun and two of the Moon; but there cannot be more than seven, nor fewer than two: when there are only two, they will be of the Sun, as is the case next year.

A lunar eclipse cannot last longer than 5¾ hours, from first entering into the Earth's penumbra to quitting it: she cannot be eclipsed partially and totally more than 3¾ hours: and she cannot be totally eclipsed more than 1¾ hours.

The subject of the Earth and Moon will be continued and concluded in our next paper.

Fig. 20.



A LUNAR ECLIPSE.

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ELY CHAPEL, ELY PLACE, HOLBORN.

THE NORTH SIDE, AS SEEN FROM THE MEWS.

THERE is much historical interest attaching to the old chapel, of the north side of which we here give an original sketch. Though situated in the midst of a thickly-peopled neighbourhood, its very existence is but little known, being sunk from view, on the west side of Ely Place, Holborn. The name of this "Place" marks it as the original site of the once magnificent London residence of the Bishops of Ely. In former times, most of the bishops had seats, or, as they were commonly called, *places*, in or near London, in which they resided during their attendance on parliament, &c.; and at the periods of this town residence they were accustomed to exercise jurisdiction in their town places, just as in their own dioceses in the country. The Bishop of Bangor had anciently a palace in Shoe Lane, Holborn; and the Bishop of Lincoln possessed one in the village of Holborn, or Oldbourne. Most of these episcopal houses, however, were either exchanged, or divided into private dwellings. Winchester Place, Southwark, once a splendid palace of the bishop of that see, was replaced by a house at Chelsea, which has also long ceased to be thus appropriated. Lambeth Palace, indeed, still fulfils its original purpose as the seat of his Grace the Primate.

By far the most extensive "citie habitation" of this kind, which was, in fact, an appendage to another see, though placed in the very heart of the metropolis, was that of the Bishop of Ely, on the spot which we are describing. And, although, since the year 1772, the successive bishops of Ely have occupied a house in Dover Street, Piccadilly, which was then annexed to their office, in lieu of the old Ely Place, there is still a small piece of property belonging to the see in the parish of St. Andrew's, Holborn, namely, the Charity School House in *Hatton Garden*, and a slip of ground running behind the houses in *Kirby* Street, in the same parish. The titles of this garden and street, together with those of *Christopher* Street, *Mitre* Court, *Saffron* Hill, *Field* Lane, suggest materials for illustrating the subject before us; but before we proceed to a particular mention of the Palace, which has long been levelled with the ground, or speak of its garden of strawberries, its vineyard, or the green meadows which it once boasted, let us turn to the sole relic of antiquity at present existing on this remarkable site, namely, the antique chapel of St. Etheldreda. Newcourt, in his *Repertorium Londinense*, written in 1700, says of Ely Chapel, "It is

to this day a very fair, large, old chapel." This venerable structure, called after the name of the foundress of the monastery at Ely, may be considered to be of about the date of 1320; though an ecclesiastical building occupied its site at an earlier period. The rich and highly decorated Eastern window, as seen from Ely Place, affords a pleasing specimen of the style of the fourteenth century. The Western window is of four mullions with cinque-foil arches; and above these, a circle filled with three roses and two quatre-foils. It is not less beautiful than that at the east end; but it is choked up with buildings, so as to be inaccessible from without, and is also greatly obscured by the west gallery within. The floor of the chapel being raised ten or twelve feet above the level of the ground in Ely Place, the access to it is by a flight of stone steps, which lead to two small doors under the great east window, the wall having been pierced for doors where there were once niches for statues. These steps and doors did not exist in 1772; the entrance having been from the south-east: the only approach is now from the east.

The chapel is a parallelogram, in length ninety-one feet, and in breadth thirty-nine. It contains about 550 sittings, upwards of half of which are free. In consequence, however, partly, of the peculiar situation of the chapel, amidst a row of houses, beyond which is no thoroughfare, it is less known than it ought to be; and there is far more than sufficient room for the worshippers who attend the morning and evening services.

The galleries on the north and south sides, are supported by plain columns of wood: these, with the ceiling, cornices, &c., which were added at the latter part of the last century, might be styled very neat in a more modern building, but certainly do not agree with the five narrow and elegant windows on each side, and the florid and grotesque ornaments between them, nor with the general aspect of the place. Here, as lately as seventy years since, the Bishop of Ely, like his predecessors, used to sit enthroned in due state. Though one window on each side has been filled up, the chapel is by no means deficient in light.

After surveying the interior, the visiter will observe a good door-way at the south-west, which appears to be of the earlier period, or middle, of the fourteenth century. Viewing it from the outside, though rather at a disadvantage, owing to the narrowness of the space, he will also notice at the angle to his left a rude and massive fragment of wall, evidently a portion of the old building, and adjoining it the octagonal turret of the chapel, crowned with a conical top or cap. In the year 1772, when Grose described it, there was a similar turret or buttress at each corner. On the south side were formerly the Cloisters; these, with the quadrangle which they inclosed, covered a space about three times as large as the area of the chapel itself. On the north side of the building, of which the view before us was taken in the present autumn, there are now stables; but anciently, there was a field planted with large and handsome trees, and surrounded by a wall.

The low arched gateway, seen to the north-west in the cut, about which a quantity of earth and rubbish has accumulated, making the ground much higher than formerly, leads into a dark souterrain, or Crypt, which, stretching under the whole extent of the chapel, is stated by Malcolm, to have been formerly used as a burial-place for inhabitants dying within the precinct, when Ely Place was tenanted by the Bishop and his establishment. This is by no means improbable, though there are no adequate grounds for the positive assertion. We have ample proof of Christenings and Marriages having been solemnized in the chapel, the original registers of which are in existence. It appears, also, that in the times of popery, no fewer than three chaplains were appointed, on certain conditions, to pray within the chapel, for the soul of Bishop William de Luda, who died in 1297, and for the souls of the bishops of Ely for ever. Considering this, and the great extent of the premises, together with the then distinctive character of the place, the persons immediately connected with it would surely find interment within its precincts; and if so, where so likely, especially those of the sacred profession, as in the crypt? This crypt has six windows on the north, answering to as many niches on the south side, but many of the windows are now stopped up. The chief entrance to it is from Ely Place, by an arched doorway under the east window. Eight enormous chestnut posts, with powerful girders, running from east to west, support the floor of the chapel; and though upon these, as well as other parts of the fabric, time has produced a visible effect, there is a massiveness and solidity about the whole edifice which afford a promise of its lasting entire for many years to come.

The earliest date which can be assigned to this place, in connexion with Ely, is that of John de Kirkeby, (appointed bishop in 1286,) who left, by will, to his successors in the see, a messuage and *nine cottages* in Holborn, which messuage became thenceforth the capital mansion of the bishop of Ely. Bishop De Luda increased the demesne, and bequeathed it, on the condition that his immediate successors should pay one thousand marks, as a fund for the payment of the three chaplains, for the performance of the services above mentioned. He also left three houses for the residence of the chaplains. Bishop John de Hotham, at his death in 1336, added six messuages, two cellars, and forty acres of land, which he gave to the canons of Ely to say masses for his soul. Camden calls Ely Place "a citie habitation of the bishops of Ely, well beseeming bishops to dwell in; for which they are beholden to John de Hotham, bishop of Ely, under King Edward the Third."

Thomas Arundel, who was consecrated in 1374, and afterwards became Archbishop of Canterbury, expended great portions of his revenue on the palace. Whether the present chapel was of his building or not, it is clear that a chapel had been in existence here before: and it is more probable, that he improved and beautified it. This munificent prelate not only repaired the palace, but also erected a large front towards the street, in the stone-work of which his coat of arms, sculptured, was to be seen in the time of Stowe.

Having given a description of the Chapel, the subsequent history of which is closely connected with that of the palace itself, we now arrive, in chronological order, at a fact worthy of record; the death of John of Gaunt, duke of Lancaster, father of King Henry the Fourth, at Ely Place. The event is thus noticed by Hollinshed:—

A.D. 1399.—In the meane time, the duke of Lancaster departed out of this life at the bishop of Elie's place, in Holborne, and lieth buried in the Cathedrall church of St. Paule, in London, on the north side of the high altar, by the ladie Blanche, his first wife.—Hollinshed (*Richard II.*)

In this palace many sumptuous feasts were held. In Michaelmas Term, 1464, the serjeants at law held their banquet here, to which, among other distinguished persons, the Lord Mayor was invited, with the aldermen, sheriffs, &c. But on the Lord Mayor's looking for the chief seat of state in the hall, as was always the custom, *within the city and its liberties*, when

the king was not present, Lord Grey of Ruthin, then Lord Treasurer of England, was advanced to the place of honour; a slight upon the chief magistrate of the city, which he took in such dudgeon, that he left the banquet-room, carrying in his train the aldermen, who are reported to have felt deep displeasure at the treatment his lordship had received, and whom he consoled with a dinner at his own house instead.

As some explanation of this occurrence, it may be stated, that Ely House and its precincts claimed a privilege of express exemption from the Lord Mayor's jurisdiction. About this a contest arose in 1567, which was not decided for three years. Sir Roger Martin, the Lord Mayor, attended with his followers at Ely Rents, and attempted to weigh bread among Bishop Cox's tenantry, which they resisted, on the ground of alleged exemption from his authority; they belonging, as they presumed, to the civil jurisdiction of the diocese of Ely. The dispute having increased to a great height, a council of arbitration was appointed, consisting, among others, of Sir Nicholas Bacon, Lord Keeper, and Robert, earl of Leicester, who at length ordered and decreed in favour of the right of the Lord Mayor and commonalty of London, which should hold, until the said bishop or his successors should show forth better matter for their defence.

Hollinshed, from whose graphic pages Shakspeare gathered an abundance of his materials, has the following passage, in reference to the conduct of King Richard the Third, then duke of Gloucester, on the morning of the execution of Lord Hastings, A.D. 1483, Morton being bishop of Ely at that time.

On the Fridaie (being the 13th of June,) manie lords assembled in the Tower and there sat in councell, devising the honourable solemnitie of the king's* coronation, of which the time appointed then so neere approached, that the pageants and subtilties were in making day and night at Westminster, and much vittels killed therefore, that afterward was cast awaie. These lords so sitting together communing of this matter, the Protector came in amongst them, first about nine of the clocke, saluting them courteouslie, and excusing himselfe that he had beene from them so long, saieing merrilie, that he had beene a sleeper that daie. After a little talking with them, he said unto the bishop of Ely,—'*My Lord, you have verie good strawberries at your garden in Holborne, I require you let us have a messe of them.*' 'Gladlie, my lord,' quoth he, 'would God I had some better thing as readie to your pleasure as that!' And therewithall, in all hast, he sent his servant for a messe of strawberries.

Then followed that extraordinary scene which took place in a room shown at this day, in the White Tower, in which the tyrant bared his withered arm, accused Hastings of witchcraft and treason, and condemned that nobleman to instant death. It is curious to trace in the striking incident in Shakspeare, and in Hume's finely-coloured account of the story, evident features of the lively sketch furnished by Hollinshed. See HUME's *History of England* (Edward V., 1483).

The passage relating to Ely Garden in the tragedy of "King Richard the Third," (Act 3, Sc. 4,) is as follows:—

A room in the Tower.—BUCKINGHAM, STANLEY, HASTINGS, THE BISHOP OF ELY, &c., *sitting at a table.*

Enter GLOUCESTER.

Ely. In happy time here comes the Duke himself.
Glo. My noble lords and cousins all, good morrow!
I have been long a sleeper; but, I trust,
My absence doth neglect no great design,
Which, by my presence, might have been concluded.
Buck. Had you not come upon your cue, my lord,
William, Lord Hastings, had pronounced your part,—
I mean your voice for crowning of the king.
Glo. Than my Lord Hastings no man might be bolder;
His lordship knows me well, and loves me well.
My Lord of Ely, when I was last in Holborn,
I saw good strawberries in your garden there;
I do beseech you send for some of them.
Ely. Marry and will, my lord, with all my heart.—*Exit* Ely.

The fame of these "beautiful strawberries †" has spread far and wide. In an old Latin play, preserved in the British Museum, a grave dialogue, in which they are celebrated, takes place between Gloucester and the bishop. Yet, notwithstanding his complaisance, Morton was taken into custody by the Protector on the same day, with Archbishop Rotherham, Lord Stanley, and others, who were suspected of being opposed to the scheme then in agitation.

In 1531, a sumptuous entertainment was given in the great hall of Ely Place, when eleven new serjeants were made. It was a feast of five days, on one of which, (Nov. 13,) King Henry the Eighth, and Queen Catherine, with the foreign ambassadors, were present. Among the guests on this grand occasion, we meet with the judges, Lord Mayor, aldermen, the principal citizens, and the crafts of London; besides knights, esquires, and gentlemen, whose places in the rooms, and at the tables, were regulated by their several degrees and stations.

It were tedious, (says Stowe,) to set down the preparation of fish, flesh, and other victuals spent in this feast, and it would seem almost incredible, and (as to me it seemeth,) wanted little of a feast at a coronation. Nevertheless a little will I touch, for declaration of the change of prices. Edward Nevill was Seneschal, or Steward; Thomas Ratcliffe, Comptroller; Thomas Wildon, Clerk of the Kitchen.

The following are extracts from the bill of fare.

There were brought to the slaughter-house twenty-four great beefs at 26*s.* 8*d.* a-piece from the shambles.

	£	*s.*	*d.*
One carcase of an oxe from the shambles .	1	4	0
One hundred fat muttons, each . . .		2	10
Fifty-one great veales, at . . .		4	8
Thirty-four porkes, at		3	3
Ninety-one pigs, at			6
Capons of Greece, of one poulter, ten dozens at (a-piece)	1		8
Capons of Kent, nine dozen and six, at .	1		0
Pullets, the best 2½*d.* each. Other pullets .			2
Pigeons thirty-seven dozen, each dozen .			2
Swans xiii dozen			
Larkes 340 dozen, each dozen . . .			5

The quantity of food, and the "prices" when compared with modern times, are equally curious.

A further notice of Ely Place, its bestowal by Queen Elizabeth on the Chancellor, Sir Christopher Hatton, and the subsequent alienation of the whole estate from the see of Ely, together with some additional information respecting the Chapel, are reserved for a future paper. M.

* Edward V., afterwards murdered with his brother, in the Tower.

† *Decora fraga.*

THE last thing to fade from my memory will be the simple, unpretending church, which, standing sacred by itself, overlooks the green hamlet where I was born, casting the twilight shadow of its spire beyond the last closed grave, and bearing its chanticlerical vane as true to the course of the wind, as a needle to its pole. Then there was the good pastor, reverently dressed in black, but indicating more in his deportment than his attire the sacredness of his calling: with a countenance sober, yet full of kind endearing sentiment, and a word on his lips that would reprove sin, without exciting anger, and encourage piety without creating presumption. As he crossed my father's threshold, we were instinctively called in from our sports; when taking each upon his knee, that now trembled with age, he would connect with our pastimes, of which he always spoke, some thought that would earnestly look up, as if in anticipation of less perishable delights; then blessing us, he would bid us remember our Creator in the days of our youth. My mother's eyes would fill with tears as he spoke, and my father, at his parting, would press him to repeat more frequently his paternal visits. These were moments inadequately appreciated then, but God grant they be the very last to which I become indifferent.—*Constantinople.*

THE OYSTER AND OYSTER-FISHERY.

The common Oyster (*Ostrea edulis,*) is well known to all, and is found, as far as our knowledge extends, on the sea coasts in every part of the globe; it was known to the Romans, who prized it so highly, that vessels were fitted out to procure it from distant countries; they even sent as far as Britain for this delicacy, considering the British Oyster better than those of the Mediterranean, and accordingly these luxurious people paid enormous prices for the produce of our coasts. At present the consumption of Oysters is very extensive, and the fishery consequently a matter of great moment, and it is protected by severe laws for the preservation of the young brood. The Oysters which are the most preferred in Great Britain, at least in the southern part of the island, are called Natives; they are a small sort, but the difference they exhibit from the larger kinds is to be attributed to cultivation and age. The principal places from whence these Oysters are procured, are the river Colne, near Colchester, at Wivenhoe, Malden, &c., in the river Mersey, and the Swale, which divides the Isle of Sheppey from the rest of Kent, at Milton, Faversham, Queenborough, &c. Although these Oysters are called Natives, they are chiefly the produce of the French banks on the coast of Normandy, from which the spawn, or spat, is fetched and laid down on the oyster-beds at the different fishing-banks; the few that absolutely spawn in these rivers belong to the Colchester River.

The spat when first cast, about the beginning of May, is of a white colour, resembling somewhat a drop of suet, in which, by the aid of a microscope, you can discover a vast number of minute Oysters, the substance in which they swim enables them to attach themselves to stones and other substances. Three days after the spat is cast, the young Oysters are a quarter of an inch in width, in three months as large as a shilling, in six as a half-crown, and in a twelvemonth they are as big as a crown-piece.

The Oyster being of such common occurrence, forms an excellent subject for dissection, and will well repay the trouble of examination; we shall explain its internal structure rather fully, as it serves to exhibit the care bestowed by the Creator on the necessities of so insignificant a creature as the apparently helpless Oyster.

The body of the Oyster is placed in the shell in such a manner, that the extremity at which the mouth is found, is placed in its narrowest part, namely, near the hinge, fig. 1, A. The general form of the body is oval, wider at one extremity than the other, with one of its sides considerably flattened. In referring to fig. 1, it is to be noticed, that part of the body has been dissected away to show the internal structure; the double mantle, by which the principal parts are invested, is free in the whole of its circumference, with the exception of a part of its margin near to the mouth on the straight side, where its two lobes are united for a short distance, forming a kind of hood to the head; the mantle, of which we have been speaking, has a double row of fringes on each of its lobes, those on the outer lobe being the shortest. The sense of feeling appears to be very acute in this part of its structure, warning the creature of the least approach of danger; these fringes can be retracted by means of a series of extremely fine muscles visible in the engraving.

Fig. 1.

The mouth, as we have already seen, is situated at the narrow extremity of the shell, and immediately behind its opening it is dilated into a kind of bag: this answers the purpose of a stomach, and if cut open will exhibit the opening of several vessels by which the bile is conveyed from the liver, a greenish mass which surrounds the stomach on all sides; the continuation of the stomach, the intestinal canal, is clearly seen winding itself beautifully round the liver, which is removed in this dissection, until it reaches the other extremity of the body at B.

The organs of breathing, nearly the same as the gills in fishes, form two double series of vessels on each side of the body; they form a net-work of vessels C, among which, just before the spat is cast, the preparation for the future brood may be seen. The heart appears in the engraving like a small white spot in the centre, and is very perfect and beautiful in its construction. Fig. 2 is a magnified representation of this organ: A is the auricle, and B the ventricle, and the vessels with which it is furnished are as beautifully arranged and as carefully devoted to their particular purposes as the large blood vessels in the most perfect animal; the principal branches are three, one leading to the mouth and the feelers, the second to the liver and stomach, and the third to the hinder part of the body.

Fig. 2.

The Oyster, as we have already said, is found in the seas of most countries, but it appears to be never met with at any great depth, or at a distance from the mouth of some large river. It is never found so high up the river as to live constantly in fresh water, though often so far distant from the sea, as to be uncovered at low water. No solid substances have been found in the stomach of the Oysters, and they are supposed to exist on very minute soft-bodied animals, or on animal substances dissolved in the surrounding water.

Most of the Oysters fattened at Colchester are brought from the little creeks between Southampton and Chichester; according to Macculloch, the best oysters in England are found at Purfleet, and the worst at Liverpool. The Oyster fishery at Poole is very considerable, supplying the London market for two months in every season, about forty sloops and boats being employed in this traffic. The Bristol,

Bath, and Gloucester markets, are supplied chiefly from the Welsh coast, two hundred fishermen and five or six sloops being engaged in the fishery. It is calculated that about ten thousand people are employed in this fishery along the coast of England.

The quantity of Oysters bred and taken in Essex, and consumed chiefly in London, is supposed to amount to fourteen or fifteen thousand bushels a year.

The fishing for Oysters is permitted from the first of September to the last day of April inclusive; or Oysters are in season, according to the common saying, in all those months which have the letter *r* in their name.

The following description of the Oyster fisheries in France, is abridged from a paper in the *Dictionnaire des Sciences Naturelles*. The Oysters which are sold in a great portion of the North of Europe, and particularly at Paris, are brought from the Bay of Cançal, on the shores of the Channel, between the town of that name, Mount St. Michael and St. Malo. The bottom of this bay is level, firm, and unbroken, and there is no current of water within it. The fishery begins usually at the end of September, and finishes in April; during all the rest of the year it is prohibited, partly for fear of destroying the young fish, and partly because the Oyster is supposed to be unfit for food during that time. The Oysters are taken, as with us, by means of a drag net. The Oysters thus taken are disembarked at the ports of Granville and Cançal, from whence they are carried to different places where fattening grounds are established. These preserves are not only of service in keeping the Oysters, but they also improve the flavour and appearance of the fish. The places for feeding the Oysters are generally placed between high and low-water mark, though not always; they are excavations, generally of an oblong form, sometimes made in the solid stone, at others dug out of the sand, and covered at the bottom with large stones and coarse sand, and not above a couple of feet in depth; they are all provided with a kind of trap-door, which is opened when the tide is out, and allows the water to escape, and the reservoirs are again filled at the return of the tide: great care is taken to prevent any mud being introduced among the Oysters, and they are frequently looked over for the purpose of removing such as have died. At Courseul, Havre, Dieppe, and some other places, the tanks are so constructed that the admission of the tide can be prevented, and the Oysters are supposed to be more tender and delicate, than those which have felt the daily effects of the sea-water.

They have a method in France of causing the Oysters to assume a green colour, and Oysters of this kind appear to be favourites with the epicure. To effect this change in colour, they choose a small receptacle into which they admit the sea-water, and let it remain a sufficient time to allow the stones with which it is paved to become green. When this takes place the Oysters are placed within it. This is done with greater care than usual, and much fewer Oysters can find room, as they must not be laid on each other. Sometimes, in about three days, the Oysters begin to turn green, but it takes a month to bring them to a deep colour; rainy weather is unfavourable to this change. These Oysters fetch a much higher price in the market than the others, and the inhabitants suppose they are fed on very scarce and high-priced herbs.

The manner in which the Oysters are conveyed to the Paris markets, is generally in baskets; great pains are taken to pack them with the mouth downwards, but as they travel with little expedition, they are seldom very good, and they rarely remove them from the basket to fatten them as we do in England. Sometimes in the Winter season they are brought to Paris in boat-loads, and they are then much more reasonable in price; these are brought from St. Just by the river Somme.

ON WRITING MATERIALS.

No. VI.

On Parchment.

A lively French writer relates, that man having met the sheep wandering, like himself, upon the earth, caressed it, flattered it, and conducted it to his abode, sheltered it under a roof as rudely constructed as that which covered himself, carried it fresh grass for its food, and took care of it. But shortly, man demanded some milk of the sheep; soon after, he asked for a little wool; and, in the course of time, he killed it for its flesh. Having done all this, he melted down its fat to supply his lamp; and, finally, he wrote upon its skin.

The ancients seem to have substituted the skins of animals, for papyrus and other articles, as a writing material, from a remote period. The origin of parchment was due to necessity, the inventive parent of so many of the arts and conveniences of life; the stimulant of man's ingenuity, when he suffers under present difficulties, or when he anticipates increased comfort and convenience. Some accounts refer the invention of parchment to a distant period, while others maintain that the date of its invention is altogether lost, amid the troubled waves of the broad ocean of distant time. According to the former, Eumenes attempted to found a library at Pergamus, about two hundred years B. C., which was to rival the celebrated Alexandrian library. One of the Ptolemies, a king of Egypt, jealous of the success of the rival library, and manifesting a spirit which, in modern times, would be thought pitiful and intolerant, made a decree, prohibiting the exportation of papyrus. The inhabitants of Pergamus, no longer being able to procure the material on which to transcribe the manuscripts to which their writers had access, adopted the skins of animals, prepared in a peculiar manner, as a substitute. They formed their library of this material, which was named after their city, *Pergamena*; whence also, it is supposed, we get our modern term *parchment*. The modern Germans and Italians, however, retain the original term: in the former language it is called *Pergament*, and in the latter *Pergamena*. The ancient Latins also applied the term *membrana* to parchment.

Some authorities, however, deny that parchment was first made at Pergamus; they state that the Hebrews had books written on the skins of animals in the time of David. According to Diodorus, the ancient Persians wrote all their records upon skins. It would appear, therefore, that King Eumenes was the improver, and not the inventor, of parchment. Dr. Prideaux imagines, that the authentic copy of the Law, which Hilkiah found in the Temple, and sent to King Josiah, was written on parchment; because, he thinks, no other material could have been so durable as to last from the time of Moses till that period, viz. eight hundred and thirty years. But the Egyptians wrote on linen; which has been preserved on mummies for ages, and exists at the present day. It has, therefore, been suggested, that the copy of the Law of Moses might have been written on this material. At any rate, however, most of the ancient manuscripts which remain, are written on parchment; and but

few on the papyrus. Herodotus, however, who lived about four hundred and fifty years B. C., relates that the Ionians, from the earliest period, wrote upon goat and sheep skins, from which the hair had been scraped, without any other preparation.

Though the term *roll* occurs several times, yet parchment is not expressly mentioned more than once, and that by St. Paul (2 Tim. iv. 13), in the first age of the Christian era. Parchment seems to have been rather a scarce commodity until modern times. It was no uncommon thing, in the middle nges, to erase a beautiful poem, or a valuable history, merely for the sake of the parchment or vellum on which it is written. Many of the valuable writings of the ancients have been recovered from beneath a monkish effusion, or a superstitious legend, by carefully following the traces of the pen, or style, which had impressed the former performance upon the membrane; which traces had not been entirely obliterated by the second scribe. Persons who prepared parchment, by erasing a manuscript, were called "parchment restorers;" thus an old French writer says:—

> Our parchment makers are very skilful. Our parchment restorers are not less so. Some parchment has been restored three or four times, and has successively received the verses of Virgil, the controversies of the Arians, the decrees against the books of Aristotle, and, finally, the books of Aristotle themselves. Parchment is like an easy man, who is always of the same opinion as the last speaker.

The preparation of parchment is by no means a pleasant or cleanly operation. Our readers may, probably, have seen carts loaded with sheep-skins proceeding from large markets, or in the vicinity of slaughter-houses. These skins are bought of the butcher by the parchment-maker, in order to prepare, from them, the material in which he deals. The skins are first stripped of their wool, which is sold to the wool merchant, who prepares it for the making of cloth, &c. They are then smeared over with quick-lime on the fleshy side, folded once in the direction of their length, laid in heaps, and so left to ferment for ten or fifteen days.

The skins are then washed, drained, and half-dried. A man called the *skinner* stretches the skin upon a wooden frame. This frame consists of four pieces of wood, mortised into each other at the four angles, and perforated lengthways from distance to distance, with holes furnished with wooden pins that may be turned like those of a violin. The skin is perforated with holes at the sides, and through every two holes a skewer is drawn: to this skewer a piece of string is tied, as also to the pins, which being turned equally, the skin is stretched tight over the frame. The flesh is now pared off with a sharp iron tool, which being done, the skin is moistened and powdered with fine chalk: then, with a piece of flat pumice-stone, the remainder of the flesh is scoured off. The iron tool is again passed over it, and it is again scoured with chalk and pumice-stone. The scraping with the iron tool is called *draining*; and the oftener this is done, the whiter becomes the skin. The wool or hair side of the skin is served in a similar manner; and the last operation of the skinner is to rub fine chalk over both sides of the skin with a piece of lambskin that has the wool on: this makes the skin smoother, and gives it a white down or knap. It is left to dry, and is removed from the frame by cutting it all round.

The *parchment-maker* now takes the skin thus prepared by the skinner. He employs two instruments; a sharp cutting tool, sharper and finer than the one employed by the skinner; and the *summer*, which is nothing more than a calf-skin well stretched upon a frame. The skin is fixed to the summer; and the parchment-maker then works with the sharp tool from the top to the bottom of the skin, and takes away about one half of its thickness. The skin being thus equally pared on both sides, it is well rubbed with pumice-stone. This operation is performed upon a kind of form, or bench, covered with a sack stuffed with flocks; and this process leaves the parchment fit for writing on.

The paring of the skin in its dry state upon the summer, is the most difficult process in the whole art of parchment-making; and is only entrusted to experienced hands. The summer sometimes consists of two skins, and then the second is called *counter-summer*.

The parings and clippings of the skin in the preparation of parchment are used in making glue and size.

Parchment is sold in *rolls* of twenty skins each. The term roll is also employed in law. It is derived from the Latin *Rotulus*, a schedule of paper or parchment rolled up into a cylindrical form. The English probably derived their law term *roll* from the French *rolle;* because legal instruments written on parchment were sewed or glued together, and thus rolled up, whence comes the verb *to enrol.*

Vellum is a kind of parchment made from the skins of young calves: it is finer, whiter and smoother than common parchment, but prepared in the same manner, except that it is not passed through the lime pit.

Parchment is coloured for the purposes of binding, &c. The green dye is prepared from acetate of copper (verdigris), ground up with vinegar with the addition of a little sap green. Yellow dye is prepared from saffron; a transparent red from brazil wood; blue from indigo, ground up with vinegar; black from the sulphate of iron and solution of galls.

Virgin parchment, which is thinner, finer, and whiter than any other kind, and used for fancy work, such as ladies' fans, &c., is made of the skin of a very young lamb or kid.

Parchment forms a considerable article of French commerce. It is made in most of the cities of France, and vast quantities of it are imported into England, Flanders, Holland, Spain, and Portugal.

THE peculiar character of the present age is sometimes denoted, perhaps not unaptly, by the term *liberality;* a term of ambiguous import, and, therefore, denoting a quality of questionable price; for if by liberality be intended a generous freedom from irrational prejudices in the forming of our opinions, or a courteous and benignant manner in maintaining them, it is a quality highly to be prized, and diligently to be cultivated. But if by liberality be intended a licentiousness of sentiment, careless about the grounds of the opinions which it adopts, and indifferent to the essential distinction between right and wrong, truth and falsehood, it is a quality worthless in itself, and noxious in its consequences. In the former sense, liberality is strictly agreeable to the spirit and the dictates of the Christian religion. In the latter sense it is no less manifestly at variance with them.—BISHOP MANT.

So just and wonderful are the overruling councils of God's Providence, that the arrow which strikes through the heart of the transgressor is oftentimes directed from the very bow which he had vainly trusted would be his strength. The companion of his sin is the first to cast reproach and shame on him for the evil which he has done.—J. S. M. ANDERSON.

HE is unfit to rule others who cannot rule himself.—PLATO.

A VISIT TO THE QUICKSILVER MINES OF IDRIA.

You know I travelled through Germany as a pedestrian—a mode of travelling which I would recommend to others through that interesting country. You must imagine me then on the second day of my journey from Trieste to Vienna, in a region thickly settled and well cultivated, and with a mixture of hill and dale sufficient to make it highly picturesque. An old countryman, with whom I stopped to converse about noon, informed me that by taking a cross-cut over the country, I should make my road to Idria much shorter than by following the highway; and as I am fond of by-ways, I received his information with pleasure, and soon after struck into a wagon-track, to point out which to me, he kindly left his work. The wagon-track, after leading me through some retired villages, dwindled into a foot-path, and even this soon after disappeared, and left me alone among the hills: but a lover of nature is never solitary, and particularly with such varied and beautiful scenery as almost every step offered to view. The country, towards evening, became a constant succession of steep rounded eminences, generally of considerable height, and just before sunset, reaching the summit of one of the highest, I had just under my feet the pretty little town of Idria. It is situated at the bottom of a deep valley or green. The houses were white, and as the streets have to follow the windings of the green ravines, it has a simple and very pleasing appearance. Near the centre is a conical hill, with a church on its summit, from which a line of a dozen little chapels along the side of the eminence, showed the course of the Via Dolorosa. A stream of water, of about forty yards in width, dashing along the bottom of the valley, and several of the excellent German roads, running zig-zag up the steep ascents, completed the view.

At the entrance to the village, my passports were examined, and the officer having ascertained that I wished to examine the mines, said he would send a person to accompany me. Accordingly a serjeant soon after called at the public-house where I lodged, to say that the mining operations were carried on day and night, and that I could enter at any time. I had noticed from the hills a dark crowd of men in front of a large building, and those, he told me, were the evening gang, about commencing the descent. I appointed six o'clock in the morning, and on waking, found him waiting for me. At the building alluded to, which is on one side of the village, and covers the entrance to the mines, we changed our dresses, and the keeper unlocking an iron gate, we found ourselves in a horizontal gallery, three or four hundred yards in length, running directly into the hill, at the foot of which the edifice is erected. Here we came to a small chapel, with a light burning before the picture of the Virgin, and turning short to the left, commenced the descent. It has nothing difficult, being effected the whole way by means of stairs in pretty good order: indeed, the mines have nothing corresponding to the ideas of terror which we are apt to connect with such places, except the atmosphere, which, throughout the mine, must be strongly impregnated with mercurial vapour, and is constantly producing salivation among the workmen.

Having descended by seven hundred and twenty-seven steps, reaching to a depth of one hundred and twenty-five fathoms, we arrived at the region where chiefly the cinnabar is procured. The mining operations are carried on principally in galleries, the friable nature of the ground or rock seldom admitting of larger chambers. The cinnabar is in strata of from two to six inches in thickness, and of a variety of colours, from dark to light red, the quicksilver sometimes being mixed with it, sometimes occurring in the intervening strata of earth or stone. Sometimes the cinnabar is of a brilliant red, and once I found it in small crystals; but such specimens are rare: generally it is of a dull red colour, and the stone is so brittle, that nothing more than a pickaxe is required. The strata affording the quicksilver appeared to have no particular direction, and occupy about one-third or one-half of the entire mass of rock. Proceeding a short distance, however, we came to galleries where the cinnabar is less common, and the quicksilver is the chief object of search. It occurs here sometimes imbedded in a friable rock, sometimes in a kind of earth, in appearance and hardness resembling talcose slate, but principally in the former. Generally it is in particles too minute for the naked eye; but often, when the work is broken, small globules present themselves, varying from a size just large enough to be seen, up to that of a common pin's head. These globules are not distributed at random through the mass, but the substance in which they occur forms strata, usually about one inch or two in thickness.

Descending still lower, we soon came to the richest part of the mine. Here the *gangue* consists almost entirely of talcose earth, mentioned above, and the globules are so large that when it is broken, they fall out and roll to the bottom of the gallery. The labourers here are relieved every four hours, being unable, from the state of the atmosphere, to work longer than this at one time. In the other parts of the mine they work eight hours. There are three hundred and sixty altogether employed in the mines, divided into three companies, and working each eight hours out of the twenty-four. Their pay is only from fifteen to seventeen kreutzers (5*d.* to 6*d.*, English,) a day, the usual pay of day-labourers throughout Germany. I found several of them suffering from the effects of the mercury.

Having loaded myself and the guide with specimens, I returned by the same way to the upper mine, and proceeded next to examine the washing-rooms, which are situated a few hundred yards from the mines. The *gangue* containing the metal is carried to this house, and if it is of the earthy kind it is broken up and thrown upon large sieves, by means of which the loose or native quicksilver, called here *jung frau*, (or virgin quicksilver,) is separated from the earth: the latter is then cast into shallow boxes, open at the ends, and a little inclined, and a gentle stream of water being made to pass over it, a rake is used, and the earthy matter is carried off. There are seven of these boxes in succession, and by the time the residuum reaches the last of them it resembles a heavy gray powder, and is sufficiently pure to be carried to the vapour furnace. The stony fragments require only a slight washing to cleanse them from the outward earthy impurities.

The furnace is half a mile lower down the valley, and at the extreme end of the village; it consists of a circular walled building, about forty feet diameter by sixty in height, on each side of which is a continuous range of chambers ten or twelve feet square, and nearly as many in height: by means of small square openings in the partition walls, the air is allowed to pass from the centre building to the remotest. Each has also a door communicating with the external air. These buildings are all of stone, and are plastered within. The *gangue*, after being prepared in the washing-house as already described, is removed to this edifice, and placed in earthen pans four inches deep and fifteen in diameter, which are piled up so as to fill the centre building. The doors

of the chamber are then carefully walled up, and a strong fire having been lighted under the centre building, the quicksilver rises in the form of vapour, and passing into the small chambers, is then condensed by the cold atmosphere around them. Some of the gangue, you will observe, was brought here in the form of the native rock: I understood them to say, that the expansive power of the vapour, together with the heat of the fire, was sufficient to cause the rock to disintegrate, and thus allow the escape of the quicksilver. When this process is over, the doorways of the chambers are once more opened, and the quicksilver, which is found chiefly adhering in drops to the sides and ceiling, is scraped off, and, running into a hollow in the floor, is taken thence to the cleaning and bottling room. It appears to act on the mortar of the chambers, for I found the latter flaky, and the crevices all filled with small globules.

The cleaning-process is very simple, a piece of canvass being merely spread over a funnel, and the quicksilver, being made to pass through this, comes out sufficiently pure. That intended for home consumption is then tied up in sheepskins, while that for exportation is put in iron bottles, large enough to contain sixty-eight pounds. The furnace is kept in operation only during the winter months, and then the vapour which escapes from it is a serious annoyance to the town; they have a blast three times every fortnight.

The price of quicksilver at the mines is one hundred and twelve florins for one hundred German pounds. The quantity annually procured is about one hundred and sixty-four tons; formerly it was greater, and brought a better price, their market, which is chiefly in China, having been injured by competition from the quicksilver mines near Almeria, in Spain.

[*Magazine of Popular Science.*]

FACTS IN COMPARATIVE ANATOMY.

No. V.

THE MOTION OF ANIMALS WITHOUT FEET.

We are apt to associate the progressive motion of animals with the possession of feet and legs, but there are many creatures that move with great swiftness, which are entirely destitute of the usual organs of motion. How swiftly the serpent glides along the ground, climbs the trunk of trees, or springs upon its prey; it possesses no true feet or legs, and yet it feels no want of these usual organs of motion. The means by which a serpent moves are found in the scales that cover the under part of its body; these are laid over each other like tiles on a house-top, the overlapping edges towards the tail. The animal in moving along, proceeds in a serpentine direction, its body appearing as in fig. 1. At different periods of

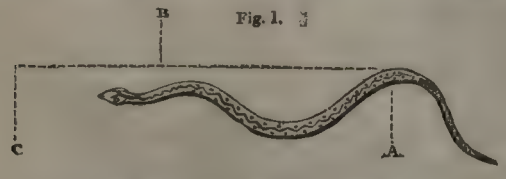

Fig. 1.

its motion it rests the edges of the scales on different parts of its belly firmly, on the inequalities of the ground; supposing A to be the fulcrum or resting-place, an endeavour to straighten the body will carry forward the whole of that portion of it which is in advance of A; if the next centre of motion is placed at B, in the forepart of the body, and the muscles behind that point and the tail are contracted, the whole of the body behind B will be brought forward, and the animal will have advanced a certain distance; this process is repeated with great rapidity, and the centres of motion occur wherever the greatest inequality of the surface on which it moves, is found. The progressive motion of a worm is effected in the same manner.

Among the molluscous animals, that is, the inhabitants of shells, such as snails, periwinkles, and others, the organ of motion is an extension of the fleshy portion of the under surface of the body; this acts in the same manner as the scales on the snake, the glutinous covering of the skin holding on to the ground in the same manner as the edge of the scale in the snake.

The leech, although it is able to move forward by the same means as the worm, generally assists itself by fixing the sucking portion of its head against the surface on which it is moving, then drawing up the tail immediately behind this spot, the body being curved into an arch or loop, it loosens the head from the surface, still keeping the tail fixed, and the body is unbent and the head thrust to a considerable distance in advance; the tail is again brought up behind the head, and the same process repeated.

The animalcules, found in stagnant waters, have, in some instances, very singular modes of progression, but their exceeding minuteness renders it impossible to state on what organs these motions depend; the Volvox (A) appears to turn round on its own axis at the same time that it moves forward. The Monas, and some others, move in all directions without any apparent cause. In the case of that singular creature, the Wheel Animalcule (B), the apparent rotation of its wheels have, perhaps, something to do with its progressive movements, but this is uncertain, for the wheels are in full action sometimes, when the animal is at rest.

MICROSCOPIC ANIMALS FOUND IN STAGNANT WATER:
Highly magnified.

A man would do well to carry a pencil in his pocket, and write down the thoughts of the moment. Those that come unsought for are commonly the most valuable, and should be secured, because they seldom return.—Lord Bacon.

Never was a human machine produced without many trials and many failures; whereas this universe, in all its endless complication, was perfect at its production, perfected in the ideas of its great Author, even from eternity —Macculloch.

He that does not know those things which are of use and necessity for him to know, is but an ignorant man, whatever he may know beside.—Tillotson.

The most sublime spectacle in the world, is a powerful mind vindicating truth in the presence of its foes, and a martyr calmly sealing his faith with his blood.—Colton's *Constantinople.*

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GENERAL VIEW OF FLORENCE.

FLORENCE AND THE FLORENTINES.

Florence, the capital of the grand duchy of Tuscany, is one of the finest cities of Italy, or even of Europe. It stands in a beautiful valley, intersected by the Arno, and occupies both sides of the river, which is crossed by four bridges; it is about five miles in circumference; its streets are well paved, and the houses in general, stately and substantial. The number of churches is very great, and they contain many choice paintings and exquisite statues.

The Church of San Lorenzo, one of the oldest in Florence, and originally the cathedral, was burned down at the commencement of the fifteenth century, and rebuilt by Brunelleschi. The church, the interior of which is ornamented with rows of Corinthian columns, is not of itself an object of much attraction, the visiter is drawn there by the far-spread fame of the chapels of the dukes di Medici*. Of these merchant dukes, Cosmo Cosmo, the progenitor, is buried in the centre of San Lorenzo, and a plain slab is inscribed "To the memory of Cosmo Medici, surnamed by public decree, the Father of his country." The mausolea of his successors, namely, the chapels before mentioned, are, however, of a very different character from the simple memorial to Cosmo. The first of these chapels, built by Michael Angelo, is a lofty square room with a recess for the altar, ornamented with ranges of Corinthian pilasters; it contains the tombs of Julian and Lorenzo Medici. The statues which recline over their sarcophagi are, next to the Moses at Rome †, the most celebrated sculptures of Michael Angelo. The subjects are curious, and have no apparent connexion with their position; they represent four human figures, at so many different periods of the twenty-four hours. The effect of Morning is represented by a female just awaking; a strong light appears to have broken her slumbers, and sleep does not seem inclined to lose its hold without a somewhat painful struggle; this is beautifully expressed in the brow and facial muscles. Night, the most celebrated of the four, has not much feminine beauty, but is remarkable for anatomical perfection, and an approximation to nature almost unparalleled: she rests upon her elbow asleep, and the observer cannot avoid expecting the head to nod and the figure to awake. The other two, Evening and Noon, figures of men reclining, are far from finished, the latter has a surprising appearance of vital energy. The statue surmounting the tomb of Lorenzo, called *Il Pensiero*, or the thoughtful, is in a sitting posture with its elbow on its knee, and the steadiness of its cold, pensive gaze, rivets the beholder with a species of fascination; on leaving, you are ready to believe that you are watched, and involuntarily turn to look again ere you escape.

Few of Michael Angelo's statues are perfectly finished; this is generally attributed to the impatience of his genius; it is possible that it proceeded from his sense of inability to fully realize his original conception, or that he purposely left the statue half emerging from the rudely-chipped marble that imagination might invest the residue with ideal perfection. The other Medicean mausoleum was designed by Vasari under Cosmo the First, and executed under Ferdinand the First. Its shape is an octagon, surmounted with a cupola: enormous sums, and the labour of two centuries, have been devoted to the decoration of this chapel, which is lined with the richest mineral produce of the East; jasper, chalcedony, malachite, porphyry, lapis lazulæ, &c., adorn the walls, and are arranged in beautiful mosaic groups, which represent the arms of all the Tuscan towns. It contains at present only two tombs, those of Ferdinand the First and Cosmo the Second. The general effect of this structure is dull and disappointing, the riches can only be seen in detail, and it is a pity that some of the enormous wealth lavished upon it, had not been appropriated to finishing the façade of this and other Florentine churches.

The *Pietra dura*, or hard stone manufactory, is almost peculiar to Florence; the stones are cut by means of a wire strung on a bow, and continually moistened with water and emery: the pieces are fitted together, and the back filled up with a cement. It is a government monopoly, and the finest pieces are never sold, but the workmen are allowed to dispose of the produce of their spare time to strangers; and small tables, broaches, &c., of Florence mosaic may thus be obtained, which, however, notwithstanding its costly material, is much inferior in effect to the Roman.

The church of *Santissima Annunziata*, gorgeously decorated with gilded embossments, rich marbles, and heavy cornices, is usually frequented by the court, and is consequently the fashionable church of Florence. The cloisters adjoining are covered with frescoes of the Florentine painter, Andrea del Sarto; the most celebrated of these, a representation of the Virgin and child, with Joseph resting on a full sack, is called the *Madonna del Sacco*, said to have been painted for the monks of the convent in time of extreme dearth, a sack of corn being the price of the picture.

After having viewed the beautiful pictures and frescoes with which the church and cloisters are lined, the visiter may observe in one corner a collection of miserable daubs, representing scenes of sickness and distressful accidents. These offensive mementos are suspended by persons who believe themselves to have been saved from the dangers thus depicted, by the miraculous interposition of the blessed Virgin. Concerning the altar-piece of the chapel of the Virgin, in this church, there is a tradition, that the painter having fallen asleep at his work, on waking found it completed by supernatural intervention. This picture is only exposed to the public on occasions of extraordinary prayers or thanksgivings; it does not prove the supernatural artist to have been of superior skill, being a very indifferent picture. In the month of May, an ass, bearing fruit, wine, and oil, is led with a ceremonial procession to the shrine where the offerings are received by the priests. The *Annunziata* contains the tombs of several renowned artists, who have contributed to the beauty and splendour of the city,—John of Bologna, Cellini, Bandnielli, and others.

The church of *Santa Maria Novella* would, perhaps, come next in point of interest to the *Annunziata*, but neither this or the remaining churches of Florence have such prominent points of attraction as to be noticed at large in this short account.

Attached to this church and convent, however, is an institution which the stranger seldom leaves Florence without visiting; namely, the *Farmacia*, or dispensary of the monks. It appears that these monks were originally in the habit of distributing a few simples

* Perhaps it may be as well here to apprize those of our readers who have not visited the Continent, that the sides of Roman Catholic churches are generally divided into compartments called chapels, and dedicated to different saints; sometimes, as is the case with San Lorenzo, these are built separately, and at a different period from the church with which they communicate, forming externally an excrescence. Mass is commonly performed in the week days at the altar of one of these chapels, which, on account of their size, are more convenient for a small congregation than the grand nave or body of the church, at the extremity of which is situate the principal or master altar. Some of the chapels in St. Peter's, at Rome, are as large as moderate-sized churches.

† See *Saturday Magazine*, Vol. III., p. 50.

for the use of the sick poor, and the time not devoted to religious offices was occupied in manufacturing these: this custom has grown into an organized and authorized sale of drugs and perfumery, which adds greatly to the revenues of the monastery, a large portion of which is now converted into a chemist's shop. No display is made towards the street; a bell at the portal gains admittance to any person requiring eau de Cologne, or decoction of bark; and for a *lira*, (about eight pence,) a stranger gets a view of the arched cells lined with bottles, and a pint of rose water into the bargain.

Seven of the principal churches are visited annually by the grand duke and duchess, and court, on foot, who say a short prayer and distribute alms at each. This takes place on Holy Thursday, the day before Good Friday, on which same day, the feet of twelve of the oldest men and women in Florence are washed, and dinner is put on table by the duke and duchess in person, assisted by the most distinguished of the court. This ceremony could not be too highly commended, were it really to be performed with feelings of proper humility, and the conviction that before the Supreme Being, the rich and poor were perfectly equal, and that difference of station is necessary for mutual dependence and the prevention of anarchy: to encourage these feelings, the feet should be washed in right earnest, and not, as is actually the case here, water from a silver basin merely sprinkled over them. The custom, indeed, has degenerated into a mere annual show, little analogous to the beautiful example of Jesus washing the feet of his disciples, which it is intended to imitate and commemorate.

Florence, during the middle ages, and up to the present time, has been the most advanced in the arts and sciences of any town in Italy, and, perhaps, taking the average of a long period, of any in the world. The Gallery of Paintings and Statues contains the *chefs d'œuvre* of various epochs. The Venus de Medicis, the most perfect specimen of female beauty ever produced by the chisel; the Knife-grinding Scythian; the Faun of Michael Angelo; and the choicest of the pictures of Raphael, Titian, Guercino, and others, are collected in a small octagonal room called the Tribune, entered from the long corridor of the gallery. In another compartment is the group of Niobe and her Sons and Daughters, supposed to have originally ornamented the pediment of a temple of Apollo; in another, the self-painted portraits of the most eminent painters of all nations and all ages. Other cabinets contain bronze statues, ornaments cut in precious stones, and collections of the pictures of the different schools, native and foreign. The palaces of the noble families of Florence also contain specimens which prove how much Italy at one time excelled the rest of Europe in the arts.

How the sciences have been cultivated will appear by an examination of the Museum, Observatory, &c. In the former is a collection of anatomical models in wax-work, an art in which the Florentines have never been equalled, scarcely even copied by any other people; these models exhibit every portion of the human body, and were constructed for the tuition of the royal princes. To these are added a few specimens of animal and vegetable comparative anatomy: the telescope of Galileo, and the lens with which the diamond was first burned, are preserved in the cabinet of natural philosophy. Science continues at the present day to be held in the highest esteem in Tuscany; the establishments of professors are on the most liberal scale, and the professors do credit to their patronage, always holding a distinguished rank among the philosophers of Europe.

The Florentines are a good-tempered, intelligent race; the upper classes are accused of want of hospitality, and the lower of dishonesty, and both, we think, with equal injustice. The former accusation proceeds from English notions of hospitality being inseparably connected with good living; but, considering the number of foreigners who are ever passing through this town, and the general shortness of their sojourn, it would be impossible for the inhabitants, whose income is limited, and denomination of money lower than most other countries, to entertain them with expensive profusion; the stranger will, however, never find them sparing of their time or trouble in ministering to his gratification. The accusation of dishonesty arises from the traveller being generally thrown among a bad set, namely, innkeepers, commissioners, vetturinos, and others, whose receipts are undoubtedly much increased by extortion. Those who have spent some time among them will seldom complain of being cheated; they are fond of bargaining, but we have known them give extra weight, or an additional quantity of an article, where they considered the customer outwitted in the price. The misfortune generally, in Italy, is the want of fixed prices, everybody trying to get as much as he can, and give as little; they have not arrived at the philosophy of the mutual convenience to the seller and purchaser of the contrary system. In no place, however, Naples excepted, will good humour go so far, and harshness so short a way, in aid of economy.

Robbery and thieving are scarcely ever known; the writer has left his carriage and luggage many nights in the open yard of an inn, and never missed the smallest article, and when anything has been dropped on the road it has been found and restored.

Probably from the effect of climate, the Florentines are indolent and fond of procrastination, Madame de Staël says, "The Florentines spend their mornings in walking on the *Lungo l'Arno*, and their evenings in asking each other if they have been there." *Pazienza*, (have patience,) is their invariable appeal, when deprecating the impatience occasioned by their laziness or carelessness. It must be confessed that they practise what they preach; their political history will evidence, that nationally as well as individually, they can bear and forbear. They are much imbued with the spirit of gambling, and in order to assist the government treasury, the lottery is allowed to exist, which fosters, or perhaps occasions, this tendency. The lottery is drawn with much ceremony by two children on a scaffolding, at the extremity of the *Uffizi*; five numbers out of ninety are drawn from a wire basket, the tickets contain three numbers, and should these three be identical with three of the five, a prize is won. The extreme rarity of the prizes will be clear from this account; nevertheless, purchasers for the tickets are never wanting, for the most part derived from the class of people who can least afford it. From continually thinking of the lottery, many of them dream of it, and have a superstitious confidence in the success of the numbers dreamed of; books with numbers appended to the ordinary subjects of dreams are consulted, and should a party once gain a prize, he continues to dream and buy tickets for the remainder of his life.

Florence in fine weather is a most delightful place; when the sun shines, the Lungo l'Arno, or bank of the river, is always warm, even when the rest of the town may be unpleasantly cold; the flower girls in their flapping Leghorn hats, who distribute bouquets to

well dressed persons, and are content with a slight occasional remuneration, add to the cheerfulness of a fine day. The *Cascina*, or grand duke's farm, a short distance from the town, forms a delightful drive, where, for six weeks during the winter-season, balls are given by the grand duke, to which English residents are liberally invited; there are also horse-races, which are chiefly supported by the English.

Florence in wet weather is a sort of extensive water-spout; the tubes which collect the water from the roofs, instead of running down the sides of the houses, stretch at irregular lengths over the centre of the street, and there empty their contents; this occasions the passenger to get not only the rain which falls directly upon the street, but all which falls upon the house tops, and that with increased force. The narrowness of the streets adds to this nuisance, which is common to Rome, Naples, and several Italian towns, though in Milan and others it has been altered. Thus it is frequently the case that people will long bear a grievance which individuals would soon remedy, for unanimity is never so certain as when there is only one opinion to be consulted.

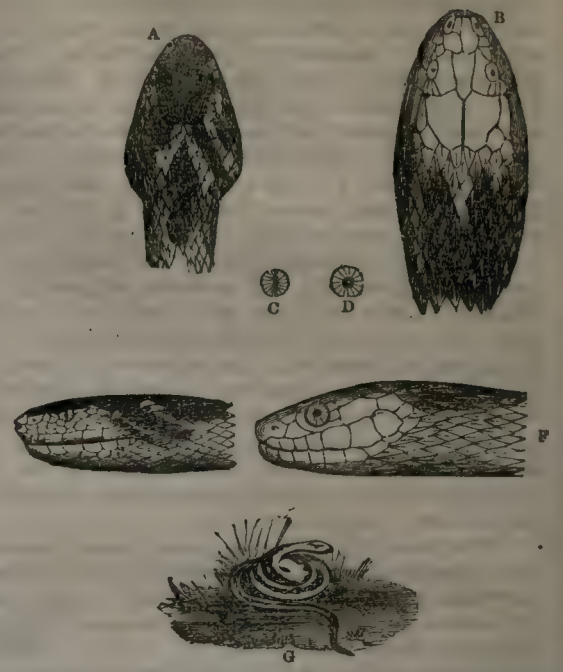
THE VIPER AND THE SNAKE.

The only reptiles of the serpent tribe known in Great Britain are the Snake, the Blind-Worm, and the Viper, or Adder; of these three, the Viper alone is venomous. As this reptile is far from being common, while the Snake is frequetly met with, it may be as well to point out the distinguishing characters of the two; for the harmless nature of the Snake enables us to handle it with impunity, and as the markings on its body are subject to variation, the poisonous Viper might be mistaken for it, if the difference of the two is not clearly understood.

The first difference is that of size, the full-grown Viper being much smaller than the Snake. The marks on the back of the Viper are zig-zagged, or lozenged, and connected with each other, while in the common Snake they are distinct from each other, and partake of the character of spots and dashes. In examining the head of the two creatures, the angle of the jaws of the viper will be found most prominent, and the neck thinner, but the eye is peculiarly different; in the Snake it is large and circular, and the pupil in the centre is also circular; the eye of the Viper, on the contrary, is smaller; the pupil long, like that of a cat in a strong light, and above it the bone forms an overhanging ridge, the same as may be seen in the eagle. If the nose is looked at from the side, it will be found more pointed than in the Snake, retreating towards the mouth, which is placed some distance back, the whole appearance indicating cunning and quickness. The attitude of the Viper also betrays it, remaining coiled up with the head elevated, ready to strike.

Another distinction between the two is, the number and arrangement of the plates on the head; this will be better understood by a reference to the engraving.

The effect of the poison of the Viper, at least in this country, has been much exaggerated. In the case of an adult in good health, a painful swelling is the consequence, which yields in a few hours to medical treatment, but it has sometimes proved fatal to a child of a few years old, and its effects are more serious to an adult, whose blood is in such a condition as to render it very susceptible of inflammation; but there is little danger to be apprehended from any of the serpent tribe, unless they are wilfully or accidentally irritated, for they are the most timid of all creatures, and always endeavour to escape from danger, instead of meeting it.



A. The Viper's Head, seen from above.—B. The Snake's Head.—C. The Eye of the Viper.—D. The Eye of the Snake.—E. Side view of the Viper's Head.—F. Side View of the Snake's Head.—G. Action of Viper when about to strike.

ON THE CUSTOM OF LIGHTING PUBLIC STREETS.

In proportion as we become habituated to the use of any instrument, or to the diffusion of any custom, we are we apt to forget the instruments or customs formerly in vogue, and to regard those which we now have as if they always had been. Yet it is useful now and then to take a retrospective glance at times gone by, if it were only for the purpose of appreciating the comforts which we now possess.

This is well exemplified in the use of street lamps. The brilliant display of gas-flames which the streets of London and other large towns exhibit, has now become so familiar to the inhabitants, that a return to the use of the old oil lamps would be regarded as a public misfortune. But what should we say if, instead of gas or oil lamps, elevated on posts, we had a lamp suspended from a string, which stretched from house to house across the street? And yet this latter mode was considered, in its day, as a most important item of advancement in social comfort. It may be interesting to trace the progress of the custom of lighting streets.

There seems to be no evidence to prove that Rome, with all its grandeur and celebrity, had any provision for lighting the streets at night. The Romans, after a nocturnal visit, had to carry flambeaux, or lanterns, or else to walk home in darkness. It appears, however, that Antioch was, as early as the fourth century, more fortunate than Rome in this respect; for some of the principal streets had lamps suspended from ropes near the baths and other public buildings. On occasions of public sorrow these lamps were left unlighted, as a symbol of mourning.

It was many centuries after this before this custom became in any degree prevalent. It appears that Paris was the first modern city which was lighted, and this not until the sixteenth century. At that period, Paris was much infested with street robbers in the

night time; and the inhabitants were ordered to keep lights burning before their houses during the night. But in 1558 the municipal authorities so far took the matter into their own hands, as to cause *fallots* to be erected at the corners of the principal streets. These fallots were large vases, filled with pitch, resin, and other combustibles; but the regulation of the flame was so inconvenient that they were shortly superseded by lanterns. The street lights were, however, too few in number; and a curious speculation was entered into by an Italian, named Laudati. In 1662 he obtained an exclusive privilege, for twenty years, in the exercise of the following trade. He undertook to erect, not only in Paris, but also in other towns of the kingdom, booths or posts, where any person might hire a link or lantern, which he might either carry, or, by paying an extra sum, have a person to carry for him. Laudati was authorized to receive from every one who hired a lantern to a coach, five sous, and from every foot-passenger three sous, for a quarter of an hour. To prevent disputes in regard to time, it was ordered that a regulated hour-glass should be carried along with each lantern.

A few years after this period, the stationary lanterns were improved in form, and greatly extended in use. They had previously been used only in the four Winter months, whereas they were afterwards lighted during the whole year.

About the middle of the last century, the Lieutenant de Police offered a premium for the invention of the best street lamp that might be devised. This led to the production of the *reverberating* lamp, as it was called. In old views of Paris, we frequently see representations of these lamps, which were suspended from a string that crossed the street, and was fastened to the houses on either side. The lamps were suspended over the middle of the road-way, at such a height from the ground as to permit vehicles to pass beneath them.

There is some doubt as to whether the London streets were lighted before the seventeenth century. In 1668, among other regulations for the improvement of the streets, was an order that the inhabitants should hang out lanterns before their houses; and in 1690, the order was made more precise, by specifying that every housekeeper should hang out a lamp or light every night, as soon as it was dark, between Michaelmas and Lady-day; and to keep it burning until the hour of twelve at night. In 1716, the common-council ordered, that all housekeepers whose houses fronted any street, lane, or public passage, should, in every dark night, that is, every night between the second night after every full moon, and the seventh night after every new moon, hang out one or more lights, with sufficient cotton wicks, to continue burning from six till eleven o'clock in the evening, under the penalty of one shilling.

Besides these private lights, there were a few public lamps set up by the corporation, and lighted by contract, for which those housekeepers who had no private lights, had to pay a small rate. This confused method was, however, found very imperfect; and in 1736, the corporation applied to Parliament for power to enable them to light the streets in a better manner. The act which they obtained empowered them to set up a sufficient number of glass lamps, which were to be kept burning from sunset to sunrise throughout the year. The result of this was that nearly five thousand street lamps were erected within the city.

During the course of these improvements, many of the continental towns were lighted for the first time. In Amsterdam, an order was issued by the magistrates in 1699, that the lamp-lighters should wipe the oil and dirt off the horn of the lanterns every day, and that horses should not be fastened to the lamp-posts: from which we may infer that horn lanterns, elevated on posts, were used at that period.

Copenhagen, the Hague, Venice, Messina, Palermo, Hamburgh, Madrid, and other places, adopted the custom of lighting the streets, at various periods during the seventeenth century. At Rome, even so late as the latter part of the last century, the streets were not lighted; but Pope Sixtus the Sixth ordered, with the object of somewhat lessening the darkness in the streets, that the number of lights placed before images of saints should be increased.

At Berlin the custom began by ordering the owners of every third house to hang out, in turns, a lantern before their doors. The next stage of improvement was the erection of lamp-posts, the lamps on which were kept lighted at an annual expense of three thousand dollars, which was paid by the inhabitants. After this, the king took upon himself the expense of lighting the streets.

At Vienna the street lamps, on their first introduction, were most inconveniently managed. There were no lamp-lighters; but the inhabitants had to take down the lamps from before their doors in the morning,—take them to the lamp-office to be filled with oil,—and light them in the evening, on a signal given by the fire-bell, which was rung for that purpose. About 1780, however, a body of lamp-lighters, who wore a uniform and who were under military discipline, was established, and Vienna became a well-lighted city.

At different times, and in different towns, various slight improvements were made in the construction and management of the street lamps; but the introduction of gas was the most memorable event connected with them. In 1792 Mr. Murdoch, of Redruth, made some experiments on the practicability of obtaining inflammable gas from various substances; and in 1797 he lighted the Soho manufactory with gas procured from coals. In 1803, Mr. Winsor lighted the Lyceum Theatre with gas; and in the following year, a large cotton factory at Manchester was lighted in the same way. These, and a few other successful attempts, drew the public attention to the subject:—Companies were formed,—gas works were established,—pipes were laid down through the streets,—shops of the better kind were lighted by gas,—and ultimately the street lamps were lighted in the same way. So rapid has been the extension of the use of gas for these purposes, that there is now scarcely a court or alley, and scarcely a respectable shop, in London, which is not lighted by gas; and the other large towns of the kingdom have long adopted a similar mode of illumination.

Be very moderate in eating and drinking. Drunkenness is the great vice of the time; and by drunkenness I do mean, not only gross drunkenness, but also tippling, drinking excessively and immoderately, or more than is convenient or necessary: avoid those companies that are given to it; come not into those places that are devoted to that beastly vice, namely, taverns and ale-houses; avoid and refuse those devices that are used to occasion it, as drinking and pledging of healths; be resolute against it, and when your resolution is once known, you will never be solicited to it. The Rechabites were commanded by their father not to drink wine, and they obeyed it, and had a blessing for it. My command to you is not so strict; I allow you the moderate use of wine and strong drink at your meals: I only forbid you the excess, or unnecessary use of it, and those places and companies, and artifices, that are temptations to it.—Sir Matthew Hale.

ON THE FEEDING OF ANIMALS.

On the provision of food which the Creator has made for animals, depends the replenishment of the earth; for, without that, fecundity would have been in vain. Yet we forget to note this perpetual miracle, the feeding of those myriads which crowd the world, because it is before us every day.

It requires considerable familiarity with natural history, and perhaps a still wider stretch of imagination, to cast over creation that rapid and comprehensive glance which would display this perpetual, this this hourly miracle, in all its force. Amid all which creation displays of contrivance, resource, power, there is nothing more calculated to astonish us than this fact, simple as it may appear to the superficial, the unceasing and unfailing supply of food to the uncountable myriads of all forms, sizes, and propensities, which crowd this world of land and water. And it is God who spreads this table daily, hourly, for every one of these multifarious beings, of which, out of many hundred thousand forms, all differing, all feeding in various ways, not a single species only, but hundreds, thousands, can be named, each exceeding in its numbers, at any moment, all the men who have lived in the earth since the creation. Most truly do they all wait on Him, and receive their meat in due season.

In what manner can he who has never yet considered be taught to contemplate this subject? Will he reflect on the labours by which he must feed himself, or those through which others feed him; the series of persons, and instruments, and toils which must precede, ere he can see on his table even a fragment of bread? Will he consider the labour and thought necessary to provide nourishment for the few animals which he has associated to himself? Can he imagine himself the keeper of even a hundred of those which he imprisons for his amusement? Will he stretch his imagination still further, and replace those hundreds by thousands, by tens of thousands, and then conceive himself taxed to feed them by his own contrivances? Should he conceive all this, and thousands of millions of times more than this, he will not then have approximated in the minutest degree; no, not by myriads of millions more, to the numbers that are fed every day, every hour, and so fed that not one perishes for want: fed under kinds which science cannot count, feeding in different ways, on different objects, all ever craving yet never wanting; and as they are fed to-day, having been fed from the beginning of the world, to be fed as long as it shall last. Does he but count the gnats which darken the air of a Summer evening,—God feeds them all as He feeds the lion and the elephant. Or will he attempt to number the multitudes of the ocean, swarming in every form of diversity and size, from the whale to that atom which the microscope barely discovers? Differ as they may, widely as they wander, various as are their desires, it is still He who prepares their table in the wilderness of the waters, that not one shall perish for lack of food.

In this we see, the beneficence at least, of the Creator of all these races, though we should see no more: nor is it a small, or a careless, or a casual effort of goodness, when so much forethought has been exercised and such arrangements made. To eat, is the proper business, and nearly the sole happiness of the inferior animals: all else is comparatively trivial, or else supplementary. To be born, to eat, to die, to revive in a posterity, such is the course of animal life: but, of all these, to eat is the centre and the purpose, for this is the designed happiness. For this end was the machinery created, and for this was life imparted: to live, and to eat, are one. It is the principle on which this multifarious creation is based. Man is the exception. Excluding him, no form of life need have been, but for this: it is the reason for life, and the final cause of life. It is a simple principle: even thus slightly viewed, it will surprise him who never before considered the plan of creation. It will surprise him far more, when he reflects on the operose system, on the complicated means and the intricacy of contrivance, the thought, the wisdom, the power applied to the attainment of a purpose as simple as it is single. For this alone, (always excluding man,) does all else exist; everything that is, is but a preparation for this end. Materials, elements, chemistry, light, heat, mechanism, multiplicity of organic forms, the earth itself, the very sun, are, that animals may eat.

It is, indeed, a system to excite surprise: but it would be even more surprising, could we believe that the Creator did not Himself feed His creation, did not contrive for that food which forms the end of His entire plan. To analyze the contrivance is, indeed, beyond our reach. It depends not on chemical laws which we can investigate: it cannot be measured and resolved by geometry. We cannot disentangle that which involves so vast a mass, and such overwhelming numbers of forms, such an universe of lives, independent in themselves, yet mutually connected and dependent, under the control of a superior force; a multitude so enormous of powers and desires, of instincts that we see but in part, and of inclinations that escape us. It is a problem too complicated for human ingenuity to investigate, executed as it is; the very possibility of its execution could not have been conceived: yet it has been executed by Almighty wisdom and power, and the whole complex system proceeds for ever, with simplicity and regularity equal to its perfection.

Is it, indeed, not a work of design, of design the most comprehensive, of forethought the most minute, of wisdom beyond the possibility of estimation, and of power which knows no bounds? No!—has it been said by that philosophy which, ever hating to believe in a Governor of the universe, has referred the whole of this marvellous system to chance. The mathematical doctrine of probabilities would labour long to demonstrate the possibility of such a system, on its own grounds: working out such an end, so regularly, so securely, through such a period of time, and under so many changes in the earth, and its inhabitants, without error as without failure.

But if we cannot analyze the whole, we know enough to oppose this worse than ignorant hypothesis, can see enough of design to leave no doubts respecting the entire one. The desires of animals prove, that to every one there is an allotted food: they are inclusive and exclusive; it is one of the adaptations which pervade all nature. The lion does not eat grass, nor does the ox prey as the tiger. It is said that variety exists, has happened, and that various kinds have chosen what pleased them. The insect races disprove this. There is a single food for a single insect: no other one desires that: it desires no other, refuses all else. If this is not design, where shall we seek it? The philosopher himself feeds twenty animals, with different kinds of food, feels his difficulties, and prides himself on his knowledge: yet he refuses to acknowledge the contrivance and providence of Him who feeds millions for ever, with ten thousand sorts of food; ever supplying their wants, ever consulting their tastes, without error, and without failure. How would He act otherwise, when this was His prime and

ultimate intention, the object of all that He has effected in the universe?

But systems for the Creator and His creation are for ever formed by those who know neither Him nor His works: but let them learn at least, before they teach. And let him also who takes no note of creation, learn to see. It is because of the beauty and regularity of this system that his want of thought discovers neither. Its very perfection is the source of his neglect or denial. In his philosophy, that which never fails, is a necessity; and that philosophy forgets how wisdom and contrivance are proved. He acknowledges that order, regularity, and certainty, are proofs of design and wisdom in the works of man; and will not see them in those of God.

Under this system of food has the earth been filled with the animal forms by which it is inhabited. To many, vegetables alone have been appointed; while there are entire tribes, such as the more minute and more imperfect marine animals, living entirely on animal food. In some, there is the inclination with the power, to feed in both modes: but whether there are animals, which can, like vegetables, feed upon sub-elementary matter, on air and water, has not been determined. Whatever might be inferred from the analogy of plants, it is hitherto not probable, because the minutest Infusoria require at least solutions of compound matter for their existence, and almost all the minute and the least perfect animals of the ocean, possess organs of some kind for apprehension. From the plant to the vegetable-eating animal, and back again to the plant, the circle is simple: while it is an essential part of the whole system of feeding, that it consists in a perpetual circulation, more or less complex: though the final term of the utmost complication of circles, is, as far as we yet know, to return everything to the plant, that it may recommence as the initiator of food. The intermediate agents between the two systems of life, are the earth, or the water, and the atmosphere; that wonderful laboratory, in which everything appears to be lost, receiving but to return again, as the earth does, if more visibly. The carcass which has been dissipated by the winds or burnt on the funeral pile, will as surely return to revive in future plants and future food, to give existence to future animals, and to perform the same round for ever, as that which has been buried in the ground, or the perished straw which forms the treasure of the agriculturist.

[Abridged from Macculloch's *Proofs and Illustrations of the Attributes of God.*]

Revenge from some hateful corner shall level a tale of dishonour at thee, which no innocence of heart or integrity of conduct shall set right. The fortunes of thy house shall totter; thy character which led the way to them shall bleed on every side of it; thy faith questioned: thy works belied; thy wit forgotten; thy learning trampled on. To wind up the last scene of the tragedy, cruelty and cowardice, twin-ruffians, hired and set on by malice in the dark, shall strike together at all thy infirmities and mistakes. The best of us, my dear lad, lie open there: and trust me, trust me, when to gratify a private appetite, it is once resolved upon, that an innocent and a helpless creature shall be sacrificed, 'tis an easy matter to pick up sticks enough from any thicket where it has strayed, to make a fire to offer it up with.—Sterne.

Life is contracted within a narrow and barren circle, year after year steals somewhat away from their store of comfort, deprives them of some of their ancient friends, blunts some of their power of sensation, or incapacitates them for some function of life.—Blair.

ON PRIZE-FIGHTING.

Prize-fighting has happily greatly declined in this country; the only one, we believe, where the brutal and disgusting practice has been cultivated. This must rejoice the heart not only of every Christian, but of every civilized being; but the practice, though checked, has not disappeared from amongst us. More than one case of death from fighting has very recently occurred.

In one of these fatal prize-fights, which took place near Newcastle, the parties, Robert Forbister and John Brown, seem to have been equally matched; they fought for a purse of twenty pounds, and the combat lasted one hour and twenty-five minutes. In the last round Brown received a blow from his antagonist on the jugular vein, and instantly fell; he was carried to a public house and died the same evening. Thus did this unhappy man quit life in a state of mind too dreadful to contemplate as that of a dying man; engaged in an act which no Christian can justify or even extenuate. Do those who were accessories to this dreadful event by subscribing, encouraging, or even looking on at this combat, ever pray? Do they ever go to a place of worship, and there entreat God to preserve them from sudden, that is, unprepared death; and yet—vile abuse of the worst,—for their *amusement*, venture to expose a fellow-creature to such an awful danger!

There are, however, persons, we blush to say it, silly enough, and, worse still, wicked enough, to defend prize-fighting. It helps, say they, to keep up national courage, to keep up the English mode of resenting an injury. We do not suppose that any of our readers will suspect us of valuing such arguments highly enough to think them deserving a serious answer, or supposing, even if they were true, that they could extenuate in the slightest degree so barbarous and *unchristian* a practice. A sufficient answer to all such false defences of prize-fighting would be contained in the reply they must give to the single inquiry, Whether prize-fighting is a Christian mode of settling a quarrel or repelling an affront? Neither this or any other country, as long as it performs its duty by extending legal protection to the person and property of the lowest, as well as the highest individual, will ever, we may be assured, want courage for her defence, whenever a proper occasion calls for it.

Who, let us inquire, would not prefer to trust his defence at a period of peril, to a sober and steady Christian neighbour, than to a brawling, fighting ruffian? Who would not place the greater confidence in the vigilance, firmness, and fortitude of the former, than on the noisy violence of the latter?

The following extract from a little book, containing a narrative of the sufferings and perils which the writer, himself a private soldier, passed through in Spain and Portugal, while serving in those countries under the Duke of Wellington, will, perhaps, strengthen our remarks with those who require experience to build their opinions on.

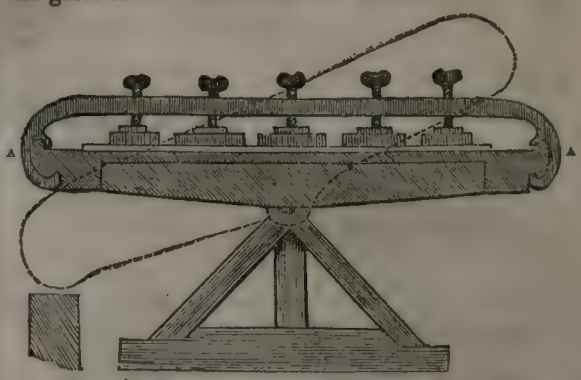
"I have," (says this simple but interesting writer,) "known some of those *bruising* fellows in the army, indeed, every regiment has its *bully;* but although they are always forward enough to abuse and tyrannise over their fellow soldiers who are not of the *fancy*, I never knew one of them that displayed even ordinary courage in the field; and it was invariably by fellows of this description, that outrages, such as those perpetrated at Badajoz, were committed." B.

LOOKING GLASSES AND MIRRORS.

The Mirrors of ancient times were formed of polished metal, those of the Jewish women, as we learn from Scripture, were of brass. It is doubtful at what time, and by whom the covering of mirrors of glass with quicksilver and tin was first accomplished; like other inventions, probably, this was discovered by several artists, perhaps at the same time, and independently of each other. The manner in which the manufacture is at present carried on, is as follows:—a slab of stone of any requisite size, is ground perfectly level and smooth; this slab is surrounded by a frame-work of wood, which rises several inches above it; but the slab itself is so fixed, that its surface is raised from the back of the frame, so as to leave a kind of groove, or gutter, all round, between the stone and the wood.

The slab, with its frame-work, is mounted so as to form a table, but so adjusted by means of screws, that it can at any time have its surface thrown into an oblique position. The table being thus prepared, its surface is covered with tin-foil, and mercury being poured over it, a hare's foot is used to spread it over the surface of the tin, and cause it to amalgamate with the latter metal; more quicksilver is then poured on it, until the surface is covered to the depth of nearly a quarter of an inch. The plate, or plates of glass, (for it is not necessary that the table should be occupied by one plate alone,) are rendered perfectly clean, and a piece of smooth paper is laid over the edge of the frame nearest the workman, dipping into the mercury. The workman holds this paper in his right hand, and taking the clean glass in his left, lays it flat upon the paper and slides it gently into the mercury, causing the edge to dip just below its surface. When the whole of the plate has passed on to the mercury, it is gently floated to the furthest end of the frame; another plate is treated in the same way, until the table is wholly covered. Leaden weights covered with green baize, and each weighing seven pounds, are then placed upon the glass nearly close to each other; these are allowed to remain on from twenty-four to thirty-six hours; they are then removed, and the table being gently raised by means of the adjusting screws, the superfluous mercury flows along the gutter towards the lowest corner, at which place there is a hole, furnished with a plug, through which it is drawn off to be used on another occasion. The plates of glass are left for a few hours more, to drain, and then, being lifted off the table, are placed on a shelf resting against the wall, to get rid of the fluid mercury that still remains; this shelf is also provided with an inclined gutter to carry off the liquid metal.

The loose weights used in this mode of silvering, are considered by some manufacturers to be dangerous, as they are likely, at times, to slip out of the workman's hand by accident; to obviate this danger an apparatus has been invented, in which a steady pressure, by means of screws, is substituted in the place of that produced by the weights. The engraving represents a section of one of these machines:—A A is a wooden clamp, which embraces at each of its ends the frame-work of the table; there as many of these clamps as the table is feet in length. The length of each clamp is furnished with screws, placed seven inches apart, which, on being turned, press on square pieces of wood covered with leather, which are attached loosely to their lower ends; it is to be observed that the screws of each clamp are so placed as to be opposite the intervals between those of the clamps on either side: this produces a more equal pressure than would be the case if the screws of each clamp faced each other. In addition to the steady pressure, and freedom from danger, of this apparatus, it possesses another advantage, the table can be tilted at once, and the superfluous mercury drawn off, thus rendering the amalgam which adheres to the back of the glass harder than in the old method.



In silvering the commoner kinds of looking-glass, the plate is lifted from the table the instant it has the tin-foil attached, and set on its end to drain, without sustaining any previous pressure. Concave and convex glasses are silvered on models made to fit them exactly. In silvering globes of glass, a metallic amalgam is prepared and poured into the globe, which is moved about in all directions until the amalgam has attached itself to the surface of the glass; this succeeds best when the glass is made hot.

There are various methods for making this amalgam, the two following may be taken as examples:—Three ounces of bismuth, half an ounce of tin, and half an ounce of lead, are to be melted together, and when somewhat cooled, three ounces of mercury are to be added. Or, one ounce of tin, one ounce of lead, and two ounces of bismuth are to be melted, and afterwards mixed with ten ounces of mercury. The reflecting glasses of sextants are covered with a reflecting substance, which is nearly pure lead.

ON HEALTH.

Slow wand'ring on the margin of the deep,
I breathe the cheering gale of health once more;
And see the billows gently dash the steep,
That rears its bold head on the sandy shore.

Fresh looks the landscape with the dews of dawn;
A blueish mist swims o'er the softened grove;
The wanton deer bound lightly o'er the lawn,
And ev'ry copse resounds with notes of love.

The village-clocks proclaim the passing hour;
The tall spires glitter to the early sun;
The ploughman, whistling, quits his low-roofed bow'r,
And now his peaceful labour is begun.

Yet not this ocean, cheered with many a sail,
Nor all these rural sounds, and pastures fair,
To solace worn disease could aught avail,
Or from his bosom chase the clouds of care.

The merry morn no rapture could impart,
Nor converse sweet of friends his hours beguile;
In vain could beauty warm his aching heart,
Or on his cold-wan cheek awake a smile.

Yet oft we slight thy worth, O, blessed Health!
Poor mortals as we are, till thou art flown;
And thy sweet joys, more dear than fame or wealth
Touch not our hearts, but pass unfelt, unknown.

Thy joys, without whose aid whate'er of blest,
Or great, or fair, the heavens to man ordain,
Is dull and tasteless to the unthankful breast,
Love loveless, youth old age, and pleasure pain.

Rev. E. Hamley.

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RAGLAND CASTLE MONMOUTHSHIRE.

RUINS OF RAGLAND CASTLE.

Time-hallowed pile! no more, no more,
Thou hear'st the hostile cannon roar;
No more bold chiefs thy drawbridge pace
To battle, tournament, or chase;
No more the valiant man thy towers;
No more the lovely grace thy bowers,
Nor bright eyes smile o'er the guitar,
Nor the trump stirs bold hearts to war

The falling meteor o'er thee shoots;
The dull owl in thy chamber hoots;
Now doth the creeping ivy twine
Where once bloomed rose and eglantine;
And there, where once in rich array,
Met lords, and knights, and ladies gay,
The bat is clinging to those walls,
And the fox nestles in those halls.

THERE are very few structures in Great Britain of higher interest, in a topographical and historical point of view, than Ragland Castle, once one of the most magnificent edifices in the kingdom. As a castellated ruin it is now without an equal, and its name is immortalized by its association with some of the most stirring passages of our national history.

A castle is supposed to have been erected here by Sir William ap Thomas and his son, William, Earl of Pembroke, in the reign of Henry the Fifth, traces of the architectural style of that period being observable in the present fabric*.

Collins, however, informs us, in the pedigree of Herbert, that Sir John Morley, Knt., Lord of Ragland, resided here in the reign of Richard the Second, consequently between the years 1377 and 1399. His daughter and heiress afterwards married into the family of Herbert, from whom it came to the noble family of Somerset, in whose possession it still remains. Other accounts state, that it came to the Somersets by the marriage of Sir Charles Somerset to Elizabeth, the grand-daughter of the Earl of Pembroke, and heiress to his son, William, Earl of Huntingdon. Sir Charles (who was Lord Chamberlain to Henry the Seventh,) was created Earl of Worcester in 1514, and died in 1526. Various alterations and additions, by successive proprietors, especially the Earls of Worcester, between the eras of Henry the Fifth and Charles the First, are attested by the fashion of the arches, doors, and ornamental parts of this "beautiful and castle-like seat," as it is termed by Camden, corresponding with the progressive styles of the intermediate ages. The last addition to the fortress, the citadel, and outworks, was probably made by the gallant Marquis of Worcester, in the reign of Charles the First.

Let us first glance at one or two of the most striking events in the changeful history of Ragland. In the reign of Edward the Fourth, the Earl of Richmond, afterwards Henry the Seventh, is said to have been detained a prisoner at this castle by Lord Herbert, in obedience to the orders of that monarch. Here, also, did the unfortunate Charles the First "find an asylum in his wanderings," after the fatal battle of Naseby, in 1645. He was received and entertained during the several visits which he made to Ragland at this period, in the most princely and sumptuous style

* According to Dugdale, the great family of Clare, in the thirteenth century, "was seised of the Castel of Rhaglan;" Richard Strongbow, the last male of this powerful line, having given, in the reign of Henry the Second, the Castle and Manor of Ragland to Walter Bloet whose daughter married Sir James Berkeley.

In 1642 Henry, first Marquis of Worcester, raised for the service of the distressed monarch, an army of 1500 foot and 500 horse, which he placed under the command of his son, the Earl of Glamorgan, and maintained at his own expense. Indeed, the devoted loyalty and indomitable spirit displayed by this great and truly excellent man in support of the royal cause, is deserving of the highest praise; and it would be difficult to find "a character in which Christian fortitude was more strikingly exemplified, or from which a more useful lesson may be learned of humility and resignation." The amount of losses sustained in consequence by himself and family, have been estimated at £900,000! After the surrender of Ragland, the woods and forests belonging to the marquis were destroyed, and his estates confiscated, amounting to £20,000 per annum. Upon the retreat of the king from Monmouthshire in September, 1645, the venerable marquis, then in his eighty-fourth year, recalled the remains of his army from the Principality, where, in different parts, they had maintained an unequal contest with the forces of the Parliament, and shut himself up in Ragland Castle, with a garrison of 800 men*, which he obstinately and heroically defended against an army under the command of Sir Thomas Fairfax, during a protracted siege of ten weeks; this fortress having the glorious distinction of being the first that was fortified, and the very last in England that held out for royalty. The capitulation of the castle took place on the 19th of August, 1646, on terms honourable both to the besiegers and the besieged, when the gallant marquis marched out at the head of his garrison with all the honours of war. There is a window still shown, at which it is said a girl in the fortress made a signal to introduce the besiegers.

The aged marquis afterwards went to London, where, contrary to the express stipulation made with Sir Thomas Fairfax, he was committed to the custody of the Black Rod. He died under confinement, during the month of December (1646) following, in the eighty-fifth year of his age, and was buried at Windsor. That this amiable and distinguished nobleman fell a victim to the cruel usage and treacherous conduct he experienced at the hands of the Parliament, there cannot be a doubt. His son, Edward, second marquis of Worcester, celebrated as the author of "A Century of Scantlings and Inventions," from which the idea of the steam-engine is supposed to have been taken, died in 1667, and his remains lie deposited in a vault on the north side the chancel of Ragland church. The family estates were recovered at the Restoration, without, however, any compensation being made for the enormous losses sustained on behalf of the royal cause.

The castle was afterwards dismantled, and the massive citadel blown up by order of Cromwell. In addition to the injuries it received on that occasion, and during the siege, it subsequently underwent very considerable dilapidations, by the numerous tenants being allowed to take the stone for building-purposes, and even the steward constructed several new farm-houses of the materials. To such an extent was this system of destruction carried, that no less than twenty-three stone stair-cases were removed, and there can be little doubt, that if the grandfather of the present noble owner of this magnificent ruin had not laudably interposed, by ordering that not a single stone more should be removed, scarcely a vestige of the edifice would have remained at the present time.

The castle stands on a gentle eminence, called *Tyn y Ciros*, or the Cherry Hill, about a quarter of a mile from the village and church of Ragland, which are pleasantly situated in a fertile and well-cultivated country, between Monmouth and Abergavenny, on the high road to Carmarthen and Milford. At a distance, the castle is almost hidden by the umbrageous foliage of the surrounding trees, and it is not until near at hand, that the visitor becomes aware of its great extent and beauty. The effect is much increased by the elaborate finish of the masonry, which is almost uninjured by time. It has been well remarked, indeed, that Ragland†, perhaps the most interesting and beautiful of all the castellated remains at present existing in England, combines "much of the strength, solidity, and martial aspect of a fortress, with the taste and elegance of a private residence." A small avenue leads to the only remaining outer gate, originally called the "White Gate," where the general view of the castle is truly magnificent; from thence the visitor is conducted across the terrace, which is covered with closely-shorn turf to the principal entrance, a splendid Gothic portal with a lofty-pointed arch, unquestionably the finest part of the whole edifice, and flanked with two massive hexagonal towers, partially covered with a luxuriant drapery of ivy, which has been so judiciously trained as to add much to the picturesque effect, by exhibiting many architectural ornaments of great beauty. A third tower, formerly called the "Closet Tower," appears to the right, which considerably heightens the grandeur and imposing aspect of the whole. This tower formerly contained the library, comprising a large and valuable collection of books, but which most unfortunately were entirely destroyed. The summits of these towers are elegantly machicolated, after the Moorish fashion, for the purpose of pouring down molten lead on assailants. The gateway was formerly defended by strong doors and two portcullises, the grooves for which still remain. The grand entrance leads into the "Pitched-stone Court," an oblong square, formerly paved, as the name denotes, but now covered with turf. Some of the principal apartments of the castle and the culinary offices surrounded it. In this court was a deep draw-well, the water of which came from a spring about two miles off, but it is now filled up. A high curtain-wall on the east side, connected the "Closet" and the "Kitchen" towers, strengthened by a tower in the centre; it is in this part that the breach was made which occasioned the surrender of the castle; it is now nearly levelled to the ground. The Kitchen tower, of great strength and solidity, (the walls being nine or ten feet in thickness,) is remarkable for two very large fire-places, but the kitchen itself is apparently small for so large an establishment, being only twenty feet square; there are also the remains of ovens. Beneath is an arched apartment of a similar size, called the "Wet Larder." A communication from the kitchen led to the buttery-hatch, and from thence to the banqueting-room, &c.

The beautiful bay-window of the stately hall, or banqueting-room, looks into the court at the south-western extremity, and from its simplicity of style and exquisite symmetry is greatly admired. Its form is a half hexagon, sixteen feet high, and the same in width; the transoms and tracery are well executed, and from the cupola above, the ivy hanging down in graceful negligence, adds greatly to its elegance and general effect. It appears to have been erected in the time of Elizabeth. A Gothic porch leads from the paved court into the grand hall, sixty-six feet long and twenty-eight feet broad, which, even in ruin, bears melancholy evidence of its former splendour. It is said to have had a curious geometrical roof of Irish oak, with a dome above for the admission of light. At the eastern extremity are sculptured in stone the arms of the first Marquis of Worcester, surrounded by the legend of the Order of the Garter, with the motto of the family beneath, *Mutare vel timere sperno*—"I scorn to change or fear." The fire-place presents a striking vestige of baronial hospitality; it is ten feet wide and eight in height, with a chimney of peculiar structure, the flues for the smoke diverging up the chimney-jambs, caused by a window a little above, apparently in the chimney. At the opposite end of the hall there is an aperture, which formerly led to a Minstrel's Gallery, where the Cambrian Bards were accustomed to pour forth their dulcet strains. The walls of the hall have, within these few years, been cruelly defaced by a daubing, to imitate wainscot, on the occasion of a grand entertainment given by the gentry to Lord G. Somerset, one of the members for the county. It was also used by the neighbouring villagers as a fives'-court not a great many years ago. Such are the mutations of time!

A door on the west side of the hall leads into the chapel, now dilapidated, which stood on the east side of the "Large Court" or "Fountain's Court," so called from the statue of a horse surrounded by a marble fountain constantly running with pure water, which formerly stood in the centre. The site of the chapel may be traced by some of the groins rising from grotesque heads that supported the roof; several steps remain of a stone staircase which is supposed to have led to the pulpit. At the upper end are two ancient whole-length figures in stone, several yards above the ground. The Fountain Court is 100 feet long by 60

* Besides his own family and friends, the officers alone were no less than four colonels, eighty-two captains, sixteen lieutenants, six cornets, four ensigns, four quarter-masters and fifty-two esquires and gentlemen.

† Ragland is supposed to have derived its name from the Welch word *Rhaglaw*, the governor, whence the corruption to Rhaglan, and afterwards Ragland. The provincial language, as in the adjoining county of Glamorgan, is the *Gwentian*, one of the three dialects of Wales, in which many of the Welsh odes were composed, and which was considered next in purity to that of the *Gwynedd*.

broad, and is remarkable for the curious fret-work of its walls and windows: the buildings which surround it, were converted into barracks during the siege. On the south, north, and east, were apartments originally occupied by the family and superior members of the household. The Picture Gallery, also on the north side, was a noble apartment, 126 feet long by 13 wide; the windows of this room still remain, and viewed from the outside of the castle, the architectural elegance of their proportions are strikingly observable.

Most of the apartments of the castle were of grand dimensions; the frame-work of the windows, in many parts, and the elaborately carved mouldings, friezes and other decorations, are in as good preservation as when first erected, and serve to give some idea of the whole when in its pristine grandeur. The immense expense and labour requisite in erecting this extensive pile* is sufficiently evident from the large vaults and subterraneous apartments formed under the Hall and Courts; no less than "above thirty vaults of all sorts of rooms and cellars" being ascertained a few years ago to be still remaining.

On the west side of the Fountain Court, a fine Gothic gateway with a flight of steps leads to the summit of the walls, and to a small-semi-octagonal tower, from the top of which, in a clear day, there is an extensive and lovely prospect of the adjacent country. The mountain scenery of Monmouthshire, is nowhere seen to greater advantage than from this point, as it includes all the principal hills presented in their most picturesque forms. The magnificent range of the *Black Mountains*, the wild and singular *Skirrid*, with the lofty *Sugar Loaf* towering behind, and the majestic *Blorenge* on the left, forming the entrance, as it were, to the beautiful vale of Crickhowell, with the vast and shadowy outline of the Brecknock Mountains looming in the back-ground, present, especially when viewed near sunset, a landscape surpassed by few in this island. The ruin itself is seen to great effect from this tower, which is invested with a deep interest in consequence of its having been the favourite resort of Charles the First, during his visits to Ragland at some of the most harrowing periods of his eventful life.

A lofty gateway with a bridge that crosses the moat on the south-west angle of the Fountain Court, leads to the tilting yard and terrace, 260 feet long and 77 in breadth. This is also said to have been a favourite resort of Charles the First, and the site of an elm tree of immense size, 26 feet in girth, with the bark nearly four inches thick, which formerly stood at the end of the terrace, tradition points out as the scene of many a conference between the monarch and his venerable entertainer. This magnificent tree fell a prey to the fury of a violent gale which occurred on Dec. 5th, 1822. A rustic gate at the lower end of the bowling-green leads to a walk extending from north to south along the west front of the castle. The outer walls of this part are apparently little injured by time, and seem as though they would endure for ages yet to come.

Perhaps the most majestic portion of this noble ruin yet remains to be described. The massive Citadel or Keep, originally called *Tur Melyn y Gwent*†,—or "Yellow Tower of Gwent;" is a detached building to the south of the castle, and was of an hexangular form, each side 33 feet in breadth; with walls well built of hewn stone 10 feet in thickness. It was defended by semi-circular bastion towers at the angles rising from the *terre pleine* on which the keep stands: and connected by a curtain-wall having a parapet and loop holes. It was originally five stories high, but the rooms have all been destroyed,—indeed scarcely half of the structure now remains. A geometrical stone staircase leads to the top of the keep, consisting of ninety broad and massive steps. In 1646, during the siege, the battlements, being weak, were soon demolished, but the tower itself received little injury, though it sustained the shock of sixty shot of 18 or 20lbs. weight, per day. It is surrounded by a moat 30 feet broad, which is still partially filled with water, and was formerly connected with the castle by a drawbridge. The late Rev. Mr. Jones of Pistill, formerly minister of Ragland, in a curious manuscript account of the castle in its ancient state, says, "That the original communication between the citadel and the castle was by means of a sumptuous bridge, encompassed about with an out-wall, with six arched turrets, with battlements all of square stone." If this account be correct, either we may infer that the keep is of earlier origin than generally supposed, or that the drawbridge was subsequently erected on the site of the "arched bridge". A quiet and secluded sunken terrace walk, twelve feet below the level of the bowling-green terrace, extends around the outward boundary of the citadel moat; in the wall are fifteen niches, said by tradition to have formerly contained statues of the Roman emperors. At the base of one of the fallen bastions, there is a postern, in good preservation, leading to the edge of the moat.

The portion of the castle facing the south, between the tower on the left of the grand entrance and the citadel, is now greatly dilapidated, having suffered severely during the siege from the fire of a battery on an eminence to the south-south-east. Here most of the principal apartments stood, and which, from being comparatively more fragile and elegant in their construction, were less able to withstand the battering of the enemy's artillery.

Time, the "adorner of the ruin," has contributed greatly to the picturesque and truly beautiful appearance which this grand edifice presents in so many different points of view; nor has the hand of man been backward in heightening the general effect, by clothing some portions of the fabric with "clambering ivy"—judiciously pruned, when too luxuriant—intermixed with roses, jasmine, and other sweet-smelling parasitical plants.

Ragland, previous to its fall, was surrounded by numerous pleasure-grounds, orchards, and fish-ponds; and contiguous to the castle were two large parks, the upper containing 428, and the lower 540 acres, "thickly planted with fine maiden oaks and large-beech trees, and richly stocked with all kinds of deer." There was also a red deer park at Llantilio Cressenny, about three miles off. The timber in the three parks was cut down by order of the Parliament after the surrender of the castle and estates. About four miles to the south-west, a large stone house called Keventilla, the head-quarters of Sir Thomas Fairfax during the siege, is worthy of notice.

Dallaway, speaking of Ragland, truly observes, "In surveying this proud monument of feudal splendour and magnificence, the very genius of Chivalry seems to present himself amidst the venerable remains, with a sternness and majesty of air and feature, which shows what he once has been, and a mixture of disdain for the degenerate posterity that robbed him of his honours. Amidst such a scene, the manly exercises of knighthood recur to the imagination in their full pomp and solemnity; while every patriot feeling beats at the remembrance of the generous virtues which were nursed in those schools of fortitude, honour, courtesy, and wit, the mansions of our ancient nobility."

Love is the shadow of the morning, which decreases as the day advances. Friendship is the shadow of the evening, which strengthens with the setting sun of life.—La Fontaine.

Sorrow breaks seasons, and reposing hours,
Makes the night morning, and the noon-tide night.
Shakspeare.

It is not sufficiently observed by all the admirers of flowers, that the agreeable perfume of plants, in full bloom, when diffused through close apartments, becomes decidedly deleterious, by producing headache, giddiness, and other affections of the brain. But it is in confinement alone that such effects become evident. In the garden, when mingled with a wholesome and exhilarating atmosphere, amidst objects that awaken the most delightful sensations of our nature, these sweets are a part of our gratifications, and health is promoted as a consequence of enjoyment so pure.

Who has not felt the excitement of Spring? of nature, in that delightful season, rising from lethargy into beauty and vivacity; and spreading the sweets of the thorn and the violet, auxiliary to our gratifications? Amidst the beauties of the flower-garden, these pleasures are condensed and refined; and the fragrance there, hovering on the wings of the breeze, cannot be imagined less wholesome than pleasant.

Whatever increases our gratifications, so peculiarly unmixed with the bad passions of human nature, must surely tend to the improvement of mankind; and to the excitement of grateful feelings towards that beneficent Creator who has so bountifully supplied these luxuries, which none are denied.—Maund's *Botanic Garden*.

* The whole space within the walls comprises 4 acres, 2 roods, and 1 perch, and including the citadel is nearly a third of a mile in circumference.

† Monmouthshire was anciently called Gwent.

ILLUSTRATIONS OF THE BIBLE FROM THE MONUMENTS OF ANTIQUITY. No. XVIII.

PROFUSE OFFERINGS OF THE EGYPTIANS.

SACRIFICES.

THE two most remarkable peculiarities in the Hebrew religion, as constituted by Moses under the Divine direction, were the institution of the Sabbath and the system of sacrifices. Though the distinction of time by weeks was well known over all the Oriental world, we find the observance of one day as a day of rest confined to the descendants of Abraham; but it seems probable that this duty had been neglected during their captivity in Egypt, for in the fourth commandment, Moses, in order to enforce a religious observance of the sacred day, states expressly the time and occasion of the Sabbatical institution, declaring that it had been hallowed from the very first week of Creation. It was not necessary to give any such explanation respecting the institution of sacrifices, for the Israelites in Egypt saw them offered every day with the profusion which always characterized that land of superstition, and they were, consequently, more in danger of showing them too much veneration rather than of letting them sink into oblivion. In the engraving at the head of this paper, we see that the Egyptians offered a greater variety of articles to their deities than any ancient nation, and we, therefore, conclude, that the Levitical precepts were designed rather to limit the sacrifices of the Israelites, than to make large claims on their homage to their Heavenly King.

Sacrifices formed a part of every ancient system of religion; the most barbarous tribes and the most civilized nations presented offerings at the altars of their gods, both as an act of homage and as a means of propitiating favour. It is manifest that this universality must have arisen from some dictate of *reason*, some demand of *nature*, some principle of *interest*, or from the *injunction of an Omnipotent Being*. It is assuredly an absurdity to maintain that Reason could have suggested an institution which Reason is unable to defend; all the philosophers of antiquity denounce the system of sacrifice as irrational, and the priests of Greece and Rome always rested their defence of it on tradition, the invariable practice and the authority of their ancestors. Nature may have pointed out the use of animals for food, but Nature could not have pointed out the destruction of food as a proceeding likely to serve any beneficial purpose; and finally, *interest*, on the notion that the Deity, like a man in power, might be won by presents, completely fails to account for the institution, because it leaves unexplained, how it happened that all men chose this particular means of propitiating the divinity. We must therefore conclude that sacrifices were of Divine appointment, and this is clearly intimated in the account of the sacrifices of Abel, Noah, and Abraham, given in the book of Genesis. Eusebius appears to have explained the nature and origin of sacrifices so very clearly, that we think it better to translate the passage from that venerable historian, rather than to give the same sentiments in our own words.

Whilst men had no victim that was more excellent, more precious, and more worthy of God, animals were made the price and ransom of their souls. And their submitting these animals in their own room, bore, indeed, some affinity to their suffering themselves; in which sense all the ancient worshippers and friends of God made use of them. The Holy Spirit had taught them that there should one day come a VICTIM, more venerable, more holy, and more worthy of God. He had likewise instructed them how to point him out to the world by types and shadows. And thus they became prophets, and were not ignorant of their having been chosen out to represent to mankind the things which God resolved to accomplish.

Though the rite of sacrifice was not an invention of man but an ordinance of God, yet in passing among the nations of the earth it became deformed with many idolatrous practices and many abominable pollutions.

The severe vengeance denounced in the Old Testament against idolatry, was provoked not only by giving the honour due to God, to stocks and stones, but also by the practice of horrible and licentious rites, by the sacrifice of children to Moloch, and by unbridled debauchery in the worship of the Syrian goddess Ashtaroth. The very minute and specific directions in the Levitical law respecting sacrifices, were designed as fences and guards against the corruptions which prevailed in the surrounding nations. The perverted ingenuity of man's depraved nature would have introduced some one or other of the obscene rites practised in every heathen nation, and calculated to gratify irregular passions, if the whole institution of sacrifice had not been given to the Jews perfect in all its parts, and with every one of its details ratified and established by the Divine decree. The historical verity of the Old Testament

is doubly illustrated by the monuments of antiquity, in relation to this subject; they show the purity of the worship established by Jehovah when contrasted with the heathen rituals; and they fully confirm the statements of the sacred historians, that when the Jews lapsed into idolatry, they also sunk into the grossest immorality and profligacy.

It is evident from the universality of the system of sacrifice, that it must have been instituted before the dispersion of mankind at the building of Babel.

Whatever custom, (says Dr. Kennicott,) has prevailed over the world, among nations the most opposite in polity and customs in general; nations not united by commerce or communication,—when that custom has nothing in nature or the reason of things to give it birth, and to establish to itself such a currency,—must be derived from some revelation: which revelation may in certain places have been forgotten, though the custom introduced and founded on such revelation still continued. And further, this revelation must have been antecedent to the dispersion of Babel, when all mankind being but one nation, and living together in the form of one large family, were of one language and governed by the same laws and customs.

The word sacrifice is sometimes used to signify every offering made to God, but it differs from a mere oblation in this very important respect, that in a sacrifice there is a real destruction of the whole or part of the thing offered, while in the mere oblation or gift no such change takes place. The sacrifices, properly so called, were wholly or in part consumed by fire; those offered by the patriarchs before the Deluge were *holocausts*, or offerings totally burned on the altars, for the permission to use animal food was not given until Noah had left the ark. Sacrifices were either *expiatory*, that is, offered to obtain God's forgiveness of past sins; *impetratory*, that is, designed to procure some future favour; or *eucharistical*, that is expressing gratitude for benefits already received. They are also divided into *bloody sacrifices*, or offerings of some animal; and *unbloody sacrifices*, consisting of the fruits of the earth.

All expiatory sacrifices were bloody, and the act of shedding the blood was one to which particular importance was attached. In the following engraving, we see that the throat of the animal is severed by the sacrificial knife, and the blood permitted to stream over the altar. From the time of Cain to the promulgation of the Mosaic law, animal sacrifices were alone used in the worship of Jehovah, but there is no doubt that the Egyptians offered unbloody oblations, such as corn, fruits, and wine, together with incense, which was, as we shall subsequently see, only offered by the priests. The universality of the belief, that "without shedding of blood there is no remission of sin," is an additional proof that sacrifices were a Divine institution, designed to typify the great and final atonement. "The law," says St. Paul, "was a schoolmaster to the Jews to bring them unto Christ," but even among the heathen, God left not himself without witness, for in every nation the traditional remembrance was retained of the connexion between the shedding of blood and the remission of sin.

Another, and scarcely less-important part in the ceremony of expiatory sacrifice, was the imposition of hands on the head of the victim. The meaning of this rite was to transfer the sins of the offender to the victim which he offered as an expiation. This was especially the case with the scape-goat, as will be shown in a future article, but that the same meaning was affixed to it in all other expiatory sacrifices, appears from the particular forms of confession prescribed for the different kinds of offerings in the rabbinical writers. The form prescribed for an individual presenting his own sacrifice, seems particularly significant:—"O God, I have sinned, I have done perversely, I have trespassed before thee. Lo! now I repent and am truly sorry for my misdeeds, *Let then this victim be my expiation.*"

It is certain that the practice of imprecating on the heads of the victim the evils which the sacrificer wished to avert from himself, was usual among the heathen. The Egyptians used to offer a white bull without blemish, as an expiatory sacrifice to Apis. After the animal was killed at the altar, its head was cut off and cast into the Nile, with the following execration:—"May all the evils impending over the heads of those who perform this sacrifice, or over the Egyptians in general, be averted on the head of this victim." Herodotus adds, that this ceremony produced such an impression on the Egyptians, that they would not eat the head of any animal; and this is confirmed by the representations of Egyptian kitchens and slaughter-houses on the monuments, in which we see that the heads of the animals were cut off immediately after their being slain. This observance of placing hands upon the head of the victim, symbolically transferring to it the sin of the person by whom the sacrifice was offered, elucidates the im-

ANIMAL SACRIFICE.

port of such phrases as, "his blood be upon his own head," &c. Thus the spies who entered Jericho declared to Rahab,—

Behold, when we come into the land, thou shalt bind this line of scarlet thread in the window which thou didst let us down by: and thou shalt bring thy father, and thy mother, and thy brethren, and all thy father's household, home unto thee. And it shall be, that whosoever shall go out of the doors of thy house into the street, his blood shall be upon his head, and we will be guiltless: and whosoever shall be with thee in the house, his blood shall be on our head, if any hand be upon him. (Josh. ii. 19.)

Thus, also, David declares to the young man who had slain Saul,—

Thy blood be upon thy head; for thy mouth hath testified against thee, saying, I have slain the Lord's anointed. (2 Sam. i. 16.)

An allusion is also made to this custom in Psalm vii.

His mischief shall return upon his own head, and his violent dealing shall come down upon his own pate.

But it is still more emphatically put forward in the punishment prescribed for the blasphemer;

The son of an Israelitish woman, whose father was an Egyptian, went out among the children of Israel: and this son of the Israelitish woman and a man of Israel strove together in the camp. And the Israelitish woman's son blasphemed the name of the Lord, and cursed. And they brought him unto Moses: (and his mother's name was Shelomith, the daughter of Dibri, of the tribe of Dan:) And they put him in ward, that the mind of the Lord might be shewed them. And the Lord spake unto Moses, saying, Bring forth him that hath cursed without the camp; and let all that heard him lay their hands upon his head, and let all the congregation stone him. And thou shalt speak unto the children of Israel, saying, Whosoever curseth his God shall bear his sin. And he that blasphemeth the name of the Lord, he shall surely be put to death, and all the congregation shall certainly stone him: as well the stranger, as he that is born in the land, when he blasphemeth the name of the Lord, shall be put to death. (Leviticus xxiv. 10—16.)

The celebrated Jewish writer Maimonides, observes on this passage, that the blasphemer was expressly marked out for punishment by those who laid their hands upon his head, and said, "Thy blood be upon thine own head," as if to say, "the punishment of this sin fall upon thyself, and not on us and the rest of the people."

That the design of expiatory offerings was to present the victim as a vicarious substitute to bear the punishment incurred by the sin of the person who offered the sacrifice, is so very obvious, that it is difficult to imagine how any person could have mustered courage enough to deny it. But as some persons, calling themselves Unitarians, have ventured to assert that the modern Jews never regard sacrifices as expiations for a sin, it is necessary to quote a few of the rabbinical authorities in which the doctrine is stated as strongly as it can be expressed by language. Nachmanides on Leviticus i., says, "It was right that the offerer's own blood should be shed, and his body burnt, but that the Creator in his mercy, hath accepted this victim from him as a vicarious substitute, and an atonement, that *its blood should be poured out instead of his blood, and its life stand in place of his life.*"

On the same passage Rabbi Bechai uses the very same language, and Rabbi Isaac ben Arama, adds, "The offender when he beholds this victim on account of *his* sin, slain, skinned, and cut in pieces, and burned with fire upon the altar, should reflect, that thus he must have been treated had not God in his clemency accepted this expiation for his life."

To these testimonies we may add the ritual observed in the sacrifice of a cock, which is still occasionally practised in Jewish families. The head of the house advances into the midst of his assembled friends and relatives, to whom he declares that he has found an expiation for his sins, lifting up the cock in both his hands. He then rubs the head of the cock against his own, saying, "May this cock be a vicarious substitute for me, may he come into my place and be an expiation for me; let this cock die, and let a fortunate life be to me and all Israel. Amen!" He then strangles the cock, cuts its throat, dashes it against the ground, and consumes it in the fire, intimating that the cock endures instead of the Jews, four different kinds of death. The inside of the bird is carefully taken out and thrown on the roof of the house for the crows, and other birds of prey, to take away, because it is supposed that sins adhere to the intestines, and, consequently, that they are carried away by the ravenous birds. The reason for sacrificing a cock is, that the word *gebher*, which in Hebrew signifies a man, in the Chaldaic dialect means a domestic fowl; and the Talmudic declaration is, "If a man (*gebher*) shall have sinned, a man" (*gebher*), or by taking advantage of the dialect, a cock "shall bear the punishment." We think this a singular illustration of the perverted ingenuity displayed by the Jews, in hiding from themselves the plain and direct testimony of their own sacred books to the coming and character of the Messiah.

THERE was a great master among the Jews, who bid his scholars consider and tell him what was the best way wherein a man should always keep: One came and said, that there was nothing better than a *good eye*, which is, in their language, a liberal and contented disposition. Another said a *good companion* is the best thing in the world. A third said, a *good neighbour* was the best thing he could desire; and a fourth preferred a man that could foresee things to come; that is, a *wise person*. But, at last, came in one Eleazar, and he said, a *good heart* was better than them all. True, said the master, thou hast comprehended in two words all that the rest have said. For he that hath a good heart, will be both contented, and a good companion, and a good neighbour, and easily see what is fit to be done by him. Let every man then seriously labour to find in himself a sincerity and uprightness of heart at all times, and that will save him abundance of other labour.—BISHOP PATRICK.

THE sensitive mind discovers poetry everywhere. As it is touched with whatever is affecting in the chances of life, so does it taste whatever is picturesque in the objects of nature. All that is majestic and lovely here, is to it a source of delight, and helps it to form a more just conception of Him who is the author of so much beauty. It is thus that in the images of earth may be recognized the tokens of eternity,—in the canopy of heaven, and the expanse of the ocean,—in the setting glories of the sun, and the melting colours of the rainbow,—visions and emblems of a brighter world.—MRS. JOHN SANFORD.

EVEN in a moral point of view, I think the analogies derived from the transformation of insects admit of some beautiful applications, which have not been neglected by pious entomologists. The three states—of the caterpillar, larva, and butterfly—have since the time of the Greek poets, been applied to typify the human being—its terrestrial form, apparent death, and ultimate celestial destination; and it seems more extraordinary that a sordid and crawling worm should become a beautiful and active fly—that an inhabitant of the dark and fœtid dunghill should in an instant entirely change its form, rise into the blue air, and enjoy the sunbeams,—than that a being, whose pursuits here have been after an undying name, and whose purest happiness has been derived from the acquisition of intellectual power and finite knowledge, should rise hereafter into a state of being where immortality is no longer a name, and ascend to the source of Unbounded Power and Infinite Wisdom.—DAVY'S *Salmonia*.

ELECTRICITY.

No. II. Conductors and Non-Conductors.

Those substances in which electricity is easily excited by friction, are called *electrics;* of which glass and sealing-wax are familiar examples. Those substances which by similar treatment do not exhibit electrical phenomena, are termed *non-electrics.* To this latter class all the metals belong. But the distinctions here referred to, are arbitrary rather than exact. It is quite true that metals, as well as some other substances, do not admit of electrical excitation by the same means as are employed for its developement in glass or wax; but this depends not so much on the capabilities of the respective bodies acted upon, as on the conditions observed by the operator.

For instance: if we hold in one hand a cylindrical piece of brass, no matter whether it be hollow or solid, and with the other hand rub it briskly either with silk or woollen, and then bring it near to a feather suspended, as in the experiments already described*, we shall find that the feather will not be in any way affected. Instead of holding the metal in the hand, if it be attached to a handle, say a rod of glass about nine inches long, or a large stick of sealing wax, and then rubbed as before directed, taking especial care not to touch the metal with any part of the body of the operator, or with any surrounding substance,—if it be now brought near the feather, that body will be alternately attracted and repelled, precisely in the same manner as when acted upon by excited glass or wax.

Hence we may perceive that the terms *electric* and *non-electric* have reference to the modes of operating with certain bodies, and not to the constitution of those bodies. It must not be concealed that the substances included under the first of these terms, *appear* to be more easily excited, whilst the electricity induced in them is more under control than in those of the other class. But this difference is due, in a great measure, to the relative conducting properties of the respective substances. Thus, if electricity be excited on glass, and the latter placed in such a situation that it may not be influenced by surrounding objects, it may be made to retain a great portion of its electricity for several hours, and even days. Not so, however, with metallic substances. Whenever they are employed as parts of electrical apparatus, if intended to retain the electricity communicated to them, for ever so short a period, they must be cut off from contact with the earth by an arrangement which is termed *insulation.* This leads us to observe that the class of bodies to which is given the name of electrics is also denominated *non-conductors,* whilst non-electrics are called *conductors.* Substances occupying a place intermediate between those just mentioned, are described as *imperfect conductors.*

A moment's reference to what takes place during the performance of some of the most simple electrical experiments will show us that a very broad line separates conductors from non-conductors. For example: when, as we have just seen, a piece of metal is held by, and in actual contact with, the hand of the operator, it is impossible to produce in it electrical phenomena; not because it is incapable of excitation, but because it conducts, or permits the electricity to pass freely along its surface; which, entering the body of the operator, escapes by that course to the earth. Here is an instance of a *conductor.*

With a glass tube, or a stick of red sealing-wax, it is otherwise. These may be held in the hand, and when excited by friction, the electricity seems to linger on them, if we may employ such a term; that only which is in the immediate vicinity of the hand being conveyed away until several minutes have elapsed. This is what is meant by a *non-conductor.*

Now let us suppose one of the most perfect non-conductors, which has been excited in the usual way, and in a room where the air is warm and dry, to be taken, whilst in that state, out of doors, or into a room where the air is damp; its electricity will be dissipated much more rapidly than in the room where it was first called into action. This furnishes an example of an *imperfect conductor;* for so long as air remains dry it is a non-conductor, although a less perfect one than glass, or resins; but, charged with moisture it becomes a conductor, but in a degree inferior to metals.

The conducting and non-conducting properties of bodies depend in some cases upon their *state,* not on their elementary constitution; for whilst in a solid form some are non-conductors, they become conductors when liquefied. But this law is limited in its operation. As respects by far the greatest number of substances which have been examined, with a reference to their electrical relations, it is found that a few general principles seem to prevail to a certain extent, beyond which our only safe guide in each case is the deductions founded on actual experiment. We here mention a few instances in proof that change of temperature, or slight difference in the colour or composition of bodies, is sufficient to produce the most opposite and apparently anomalous results.

Green bottle-glass, when heated to the highest degree possible, still continues a non-conductor; but flint-glass, when so heated, becomes in a slight degree a conductor. Raw or unbleached silk is a more perfect non-conductor than that which has been bleached; whilst the latter is superior to dyed silk, some kinds of which become imperfect conductors, partly owing perhaps to a change of structure, but chiefly on account of the colouring ingredients with which it is imbued rendering it more susceptible of moisture. In almost all cases those substances which in a solid state are non-conductors of electricity, acquire conducting properties when fused or liquefied; but in proportion that they conduct electricity, they lose almost entirely their power of conducting *heat.* It has hence been inferred that these phenomena are mutually dependant on, or at any rate that they are very intimately connected with, each other.

The transition from non-conducting to conducting properties, as exhibited by certain substances which soften gradually by heat before they become quite liquid, is a most satisfactory, as it is also an exceedingly beautiful illustration, that the states of bodies, in some cases, determine their peculiar habits; whilst in others the changes thus effected have no perceptible influence. Water, in the state of ice, and at a certain temperature, (—13°) is a non-conductor. At a temperature above that just mentioned, ice is an imperfect conductor, and nearly in the same degree as water in a liquid and vaporous form. Certain combinations of metals with other substances, which in a solid state are non-conductors, continue so when heated, even after they have become so soft as to flow as readily as treacle; but the moment they become quite liquid, they conduct electricity very perfectly. Sulphur, sugar, camphor, and resin, furnish examples of substances which are non-conductors equally in a liquid as in a solid state.

The mere forms, or rather the relative sizes, of bodies, will also alter their habits with respect to electricity. Glass and sulphur in a solid state are non-conductors; but when pounded, so as to be in the form of powder, they are conductors.

* See *Saturday Magazine,* Vol. XIII., p. 112.

The rate at which electricity moves through substances which are good conductors is so extremely rapid, that it is difficult, and perhaps impossible, to estimate it with any degree of accuracy. Various contrivances by means of wires have been adopted, in the hope of obtaining information on this subject, and of determining the rate at which this subtle element travels. But whatever has been the length of the wires, the electricity has appeared to pass through them instantaneously. In one instance a circuit was formed, four miles in length, two of which consisted of wires, supported, at a convenient height from the ground, on sticks of baked wood, and the remaining two miles, the electricity was made to traverse the ground itself, which at the time was unusually dry. But notwithstanding this apparent impediment, the whole four miles were traversed so rapidly that it was impossible to note any interval between the beginning and the ending of the discharge. In another case an apparatus was constructed, consisting of a continuous wire, *eight miles* in length, through which a charge of electricity passed with such inconceivable velocity that its ingress and egress appeared to be perfectly simultaneous. In conducting experiments with the apparatus just mentioned, more than ordinary care seems to have been observed; the senses of sight, feeling, and hearing, in many different individuals having been appealed to, separately, as well as in conjunction.

By more recent researches, and an arrangement totally different from either of those above referred to, it is said that the velocity with which electricity traverses a copper wire has been ascertained to be greater than that with which light proceeds from the sun to the earth. The motion of the latter is estimated at about 197,000 miles in a second; but electricity, it is affirmed, moves at the prodigious rate of 288,000 miles in a second.

Here let us observe that it is not the identical particle (or accumulation of particles) of electricity, which traverses a conductor from one extremity to the other. We have before mentioned that electricity pervades, or rather enters into the constitution of matter, in all its diversity of forms; and hence we can understand that a sudden impulse is communicated to the electricity already present in a conducting substance, which impulse is transmitted from particle to particle throughout its whole length, but with such amazing rapidity that to our senses it appears the work only of an instant—a portion of time too minute for the exercise of any distinct act of thought or volition.

The following table contains the names of some of the substances with which we are most familiar, belonging to each of the classes of whose properties we have been treating; and they are arranged, as nearly as possible, in the order in which they possess conducting or non-conducting qualities.

CONDUCTORS.	NON-CONDUCTORS.
Metals	Shell-lac
Charcoal	Amber
lumbago (Black-lead)	Glass
Strong acids	Sulphur
Acid and saline solutions.	Resins
	Diamond, and other transparent gems.
IMPERFECT CONDUCTORS.	Silk
Water, and Ice above —13° Fahrenheit	Wool, furs, hair, feathers
Green vegetable substances	Dry paper, parchment, and leather
Living animals	Dry air, and gases
Flame, smoke, and vapours	Baked wood
Damp air.	Dry vegetables.
	Ice below —13° Fahrenheit.

Who pants for glory finds but short repose,
A breath revives him, and a breath o'erthrows.—Pope

LET US GO TO THE WOODS.

Let us go to the woods—'tis a bright sunny day:
They are mowing the grass, and at work with the hay.
Come over the meadow and scent the fresh air,
For the pure mountain breezes are everywhere
We'll follow this winding path up to the hills,
And spring with a lightsome foot over the rills.
Up—up—it grows sweeter the higher we get,
With the flowers of the season that linger here yet:
Nay—pause not to gaze at the landscape now;
It is finer when seen from the high hill's brow.
We will gather all curious flowers as we go;
The sweet and the scentless, and those that bend low;
The pale and the gaudy, the tiny, the tall,
From the vine, from the shrub, we will gather them all.

Now here's the *Clematis*, all graceful and fair;
You may set it like pearls in the folds of your hair.
And if for your bosom you'd have a bouquet,
Here's the *Meadow-pink* sweet, and the *Touch-me-not* gay.
Here's the full-blown *Azalea*, perfuming the air,
Here's the *Cardinal-flower*, that a princess might wear.
And the wild-mountain *Phlox*, pink and purple and blue,
And *Star-flowers*, both of white and of golden hue.
And here's a bright blossom, a gay one indeed,
Our mountain-maids name it the *Butterfly-weed*.
So gorgeous its colours, one scarcely can tell,
If the flower or the insect in beauty excel.

Here's the low dwarf *Acacia*, that droops as it grows,
And its leaves, as you gather them, tremble and close.
And near us, I know by her breath on the gale,
Is the tall yellow *Primrose*, so pretty and pale.

Here's the *Pigeon-pea*, fit for a fairy's bowers,
And the purple *Thrift*, straightest and primmest of flowers
Here is *Privet*, no prettier shrub have we met;
And the *Midsummer-daisy* is hiding here yet.

But stay—We are now on the high hill's brow!
How bright lie the fields in the sun-light below!
Do you see those white chimneys that peep o'er the grove?
'Tis your own little cottage, the home that you love;
Let us go by the fields where the *Chinquapins* are,
And through the long lane where the *Chestnuts* hang fair
They are scarcely yet ripe, but their tender green
Looks lovely the dark clustering foliage between:
And we'll stop at the nest that we found in the wood,
And see if the *Black-bird* hath flown with her brood:
And we'll list to the *Mocking-bird*, wondering thereat,
Till he pauses, as if to ask, 'Who can do that?'
We will listen and gaze, for the lowliest thing,
Some lesson of worth to the mind can bring.
If we read Nature's book with a serious eye,
Not a leaf but some precious thought on it doth lie:
And 'tis good to go forth among scenes like these,
Amid music and sunshine, and flowers and trees,
If 'twere only to waken the deep love that springs
At the sight of all lovely and innocent things.—?

The murmuring of waters, the tinkling rill, the whispering winds, the sound of the forest in the blast, the rush of the cascade, the roaring of the ocean, and the voice of the thunder, are scarcely more than the effects of simple sounds. The harmony of the groves, as it is termed, is often also little else. Even the little musical sounds of other animals produce similar effects; as the union of sounds, so unrelated and so unmusical as the lowing of cattle, the bleating of sheep, the cawing of rooks, the cooing of pigeons, and even the woodman's axe or the smith's hammer, with the sheep-bell, the cuckoo, the evening song of the thrush, and the distant bells of the village, often produce a rural concert, which few can feel without emotion, though even a refined musician might be extremely troubled to point out either harmonies or melodies. These are the rural sounds which the poet has celebrated. That their effects have been sought in associations, is true; or that they imply pleasing associations, enhancing their charm, no one will question: but there is no musician who cannot distinguish the primary beauty, as it is he also who will feel the effects in the most lively manner.—Macculloch.

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CHINA. No. X.

SCENE IN A CHINESE DRAMA.

DOMESTIC MANNERS OF THE CHINESE, AS EXHIBITED CHIEFLY IN THEIR DRAMATIC WRITINGS.

In the bulky literature of the Chinese the drama fills a space of some importance; and although it does not appear that they can boast of any great national dramatists, to whose names they may refer with pride, yet it cannot be said that the number of their dramatic compositions is inconsiderable. They possess a collection of plays in 199 volumes, from which have been selected 100 pieces, comprising, it is supposed, the flower of the whole. Out of this selection, which is styled the *Yuen-jin-pe-tchong*, a few favourite productions have been taken, and translated into European tongues,—some into French and some into English, while a few others have been analyzed and shortly described. As the restrictions which the Chinese have imposed upon the intercourse of "barbarians" with the Celestial Empire, prevent us from becoming acquainted with their domestic life in the ordinary manner, the study of their drama has been deemed an object of importance, as offering another mode of acquiring the desired knowledge. Sir George Staunton, indeed, has expressed the opinion, that their dramatic works are less calculated, on the whole, than their novels, to reward the labour of the translator.

Too local and national to please much as mere compositions, (says that writer,) and their minute beauties of style and language necessarily, in great measure, lost in the translation, the remaining sources of interest are but slender; the dramatic dialogue drily rendered, and unaided by the talents of the actor, can convey, generally speaking, no more than a very imperfect outline of that interesting picture of life and manners, which in their novels and romances is filled up in its minutest details.

Others, however, have thought that the drama of the Chinese will be found, on further examination, to be one of the most interesting portions of their general literature, and that it will afford us a greater insight into the habits, manners, and sentiments which prevail in their domestic life than any other species of composition. An important part of a Chinese drama consists of the songs which are scattered throughout it; it is difficult to render their meaning in another language, and thus they have been often omitted in our translations. Sir George Staunton says, that whatever is refined or elaborate in the language of the Chinese drama, seems to belong almost exclusively to these songs, or as they might more properly be termed, marked and emphatic passages intended to be sung; they have been described by Bishop Hurd, in his discourse on poetical imitation, as affording a rather remarkable instance of "coincidence between the Chinese and the Grecian models," and as somewhat resembling in character

the ancient chorus. As a specimen of these effusions, the following stanza, supposed, in one of their dramas, to be sung by the khan of the Tartars, may be taken.

The autumnal gale blows wildly through the grass, amidst our woollen tents,
And the moon of night, shining on the rude huts, hears the lament of the mournful pipe;
The countless hosts, with their bended bows, obey me as their leader;
Our tribes are the distinguished friends of the family of Han.

The obscurity which often runs through these bits of irregular verse is accounted for by Mr. Davis, who tells us that, according to the Chinese themselves, the gratification of the ear is the main object, and that sense appears sometimes to be neglected for the sake of a pleasing sound. The portion of their plays which is merely spoken, is in the language of common conversation, and is in most cases perfectly intelligible.

Stage-players are not held in great respect by the Chinese. Females are not prohibited from acting on the stage by anything in the code of laws, but it is provided that "all strolling players, who shall be guilty of purchasing the sons or daughters of *free* persons, in order to educate them as actors or actresses, or who shall be guilty of marrying, or adopting as children, such free persons, shall, in each case, be punished with a hundred blows of the bamboo." The same punishment is extended to the seller of free persons, and to females, born of free parents, intermarrying with strolling players. It is said that in Pekin alone there are several hundred companies of comedians, when the court is there; and that at other times they travel about from one city to another. A company generally consists of eight or ten persons, who are literally the servants, or slaves, of the master or manager. They travel in a covered barge on canals or rivers, near to which most great cities in China are situated; these barges are their habitations, and in these they are instructed in their parts by the master. When called on to perform before a party, a list of the plays which they are prepared to represent is put into the hands of the master of the feast, who consults his guests as to the choice to be made; this point being settled, the *dramatis personæ* are read over, and if it should happen that a name occurs therein corresponding with the name of any of the guests, another piece is immediately chosen, in order that no offensive act or allusion in the play may be coupled with the name of the auditor. Mr. Davis observes, that perhaps this restriction exists only on paper, and is not followed up in practice, just as the statute which prohibits musicians and stage-players from representing in any of their performances, "emperors, empresses, famous princes, ministers, and generals of former ages," is perpetually infringed; such representations being, in fact, the favourite and most usual subjects of theatrical exhibition. There is indeed a saving clause in the prohibition, which says, that "this law is not intended to prohibit the exhibition upon the stage of fictitious characters, of just and upright men, of chaste wives, and pious and obedient children; all which may tend to dispose the minds of the spectators to the practice of virtue."

When the common people wish for a theatrical entertainment, they subscribe among themselves a sum sufficient to cover the moderate expense of erecting the temporary theatre and paying the actors. According to De Guignes the temples, or pagodas, are sometimes used for theatres; and this would not be surprising, as they are known to be the common places of resort for gamblers, and the lodging-houses of foreign ambassadors and officers travelling on the public service. Mr. Davis observes, that in this respect the Chinese would not be singular; our old *mysteries* and *moralities* were frequently played in churches. Taverns in China have a large room set apart for entertaining guests with theatrical exhibitions, just as, in England, companies of players had occasional stages erected in the yards of the principal inns, in Queen Elizabeth's time. By these arrangements, the want of public buildings in the Chinese cities, such as in European cities are appropriated to theatrical exhibitions, would be sufficiently compensated for; but the Chinese have a further resource in their temporary theatres. A company of players will, at any time, construct a theatre in two hours: a roof of mats is supported on a few posts of bamboo; a platform of boards is raised six or seven feet above the ground; three sides of it are covered with curtains of painted cotton, while the fourth is left open to the audience.

When Lord Macartney's embassy was staying at Tien-sing, in the journey up the river Peiho, towards the capital, a temporary theatre was erected opposite to his Excellency's yacht. The outside was adorned with a variety of brilliant and lively colours, "by the proper distribution of which, and sometimes by their contrast, it is the particular object of an art among the Chinese to produce a gay and pleasing effect." The inside of the theatre was equally well decorated; and the company of actors successively exhibited, during the whole day, several different pantomimes and historical dramas. The performers were habited in the ancient dresses of the Chinese at the period when the personages represented were supposed to have lived.

One of the dramas (says Sir George Staunton) particularly attracted the attention of those who recollected scenes somewhat similar upon the English stage. The piece represented an emperor of China and his empress, living in supreme felicity, when, on a sudden, his subjects revolt; a civil war ensues, battles are fought, and at last the arch-rebel, who was a general of cavalry, overcomes his sovereign, kills him with his own hand, and routs the imperial army. The captive empress then appears upon the stage in all the agonies of despair, naturally resulting from the loss of her husband and of her dignity, as well as the apprehension for that of her honour. Whilst she is tearing her hair, and rending the skies with her complaints, the conqueror enters, approaches her with respect, addresses her in a gentle tone, soothes her sorrows with his compassion, talks of love and adoration, and, like Richard the Third with Lady Anne, in Shakspeare, prevails, in less than an hour, on the Chinese princess to dry up her tears, to forget her deceased consort, and yield to a consoling wooer. The piece concludes with the nuptials and a grand procession.

Our engraving represents one of the principal scenes in this drama.

The subjects of the pieces exhibited are, for the most part, historical, and relate generally to the transactions of remote periods; in such cases the dresses are conformable to the ancient costume of China. There are others, however, that represent the Tartar conquest, but none built on historical events subsequent to that period. The ancient drama is preferred by the critics. They have also comic pieces, in which there is always a buffoon, whose grimaces and low jests, like those of buffoons elsewhere, obtain from the audience the greatest share of applause. The dialogue in all these dramas, whether serious or comic, is conducted in a kind of monotonous recitative, sometimes, however, rising or sinking a few tones, which are meant to be expressive of passionate or querulous cadences. The speaker is interrupted at intervals by shrill harsh music, generally that of wind-instruments, and the pauses are

invariably filled up with a loud crash, aided by the sonorous and deafening gong, and sometimes by the kettle-drum. An air or song generally follows. Joy, grief, rage, despair, are all attempted to be expressed in song on the Chinese stage.

The unity of action is so far preserved, that they have no actual change of scene, but change of place must frequently be supposed. To assist the imagination in this respect, their devices are whimsical enough. If it be necessary to send a general on a distant expedition, he mounts a stick, takes two or three turns round the stage, brandishes a little whip, and sings a song; when this is ended, he stops short, and recommences his recitative, the journey being supposed to be performed.

The want of scenery, (says Sir J. Barrow,) is sometimes supplied by a very unclassical figure, which, just the reverse of the *prosopopœia*, or personifications of grammarians, considers persons to represent things. If, for instance, a walled city is to be stormed, a parcel of soldiers piling themselves on a heap across the stage, are supposed to represent the wall over which the storming party is to scramble. This puts one in mind of the shifts of Nick Bottom: "Some man or other must present wall," and "let him have some plaster, or some loam, or some rough-cast about him, to signify wall."

The audience are never left in doubt as to the character which is produced before them; for the *dramatis personæ* are introduced in appropriate speeches to the acquaintance of the spectators, each performer on his first entry stating who and what he is, what remarkable deeds he has performed, and what are his present views and intentions. Thus, in the opening scene of *An Heir in his Old Age*, which has been translated by Mr. Davis, the *dramatis personæ* being a family of the middle class in China, consisting of an old man, his wife, his second wife, his daughter, his son-in-law, and his nephew; in the opening scene, the old man himself, Lew-Tsung-sheu, comes forward and speaks thus:—

I am a man of Tung-ping-foo; my surname is Lew, my name Tsung-sheu. I am sixty years of age, and Le-she, my wife, fifty-eight. My daughter Yin-chang's age is twenty-seven, and that of her husband, Chang-lang, thirty. I once had a brother named Lew-Tsung-taou, whose only son was in his infancy called Yin-sun. [*He sighs.*] This child has a most unhappy destiny! My brother died very early and left a widow. As she and my wife could not agree together, my sister-in-law wished with her son to spend the days of mourning in her own family. Thus she might, in the first place, depend on her parents for support; and secondly, by the labour of her hands procure something towards her son's education. Soon afterwards this sister-in-law suddenly died, and left her son destitute. His relations upon this said to him, "What are you doing here, child? Have you not an uncle at Tung-ping-foo, well-known to every one? Why do you not go to him?" They gave the youth some money for the journey. He came to to Tung-ping-foo to seek me, bringing his mother's bones with him; and I had them deposited with those of my brother. This young man is now twenty-five—Alas! that wife of mine still remembers her quarrel with his mother; for on every slight occasion she abuses him; and frequently causes him to be beaten. She cannot bear even the sight of my nephew!

During Lord Macartney's embassy, among the diversions given in honour of the Emperor's birthday at the court of Ge-hol, in Mant-choo, Tartary, was a Chinese comedy, to which the ambassador was invited. The comedy began at eight o'clock, and lasted till noon. The emperor, was seated on a throne opposite the stage, which projected a good deal into the pit. The boxes were on each side, without sides or divisions. The women were placed above, behind the lattices, so that they might enjoy the amusements of the theatre without being observed. The Emperor sent for the Ambassador and Sir George Staunton soon after they entered, and told them with great condescension of manner, that they ought not to be surprised to see a man of his age at the theatre, for that he seldom came there except upon a very particular occasion like the present; for that, considering the extent of his dominions, he could spare but little time for auch amusements.

The theatrical entertainments, (says Lord Macartney,) consisted of great variety both tragical and comical; several distinct pieces were acted in succession, though without any apparent connexion with one another. Some of them were historical, and others of pure fancy, partly in *recitativo*, partly in singing, and partly in plain speaking, without any accompaniment of instrumental music, but abounding in battles, murders, and most of the usual incidents of the drama: last of all was the grand pantomine, which from the approbation it met with, is, I presume, considered as a first-rate effort of invention and ingenuity. It seemed to me, as far as I could comprehend it, to represent the marriage of the Ocean and the Earth. The latter exhibited her various riches and productions, dragons, and elephants, and tigers, and eagles, and ostriches, oaks and pines, and other trees of different kinds. The Ocean was not behindhand, but poured forth on the stage the wealth of his dominions, under the figure of whales and dolphins, porpoises and leviathans, and other sea monsters, besides ships, rocks, shells, sponges and corals, all performed by concealed actors, who were quite perfect in their parts, and performed their characters to admiration. These two marine and land regiments, after separately parading in a circular procession for a considerable time, at last joined together, and forming one body came to the front of the stage, when after a few evolutions they opened to the right and left to give room for the whale, who seemed to be the commanding officer, to waddle forward; and who, taking his station exactly opposite to the emperor's box, spouted out of his mouth into the pit several tons of water, which quickly disappeared through the perforations of the floor. This ejaculation was received with the highest applause, and two or three of the great men at my elbow desired me to take particular notice of it; repeating at the same time, *Hao kung hao*,—'charming, delightful.'

Sir J. Barrow suspects that the amusements of the theatre have in some degree degenerated at court since the time of the Tartar conquest. Dancing, riding, wrestling, and posture-making, are more congenial to the rude and unpolished Tartar, than the airs and dialogues of a regular drama, which is better suited to the genius and spirit of the ceremonious and effeminate Chinese.

I am led, (he says,) to this observation, from the very common custom among the Chinese officers of state of having private theatres in their houses, in which, instead of the juggling tricks above mentioned, they occasionally entertain their guests with regular dramatic performances.

In short, (observes the same writer,) the greater part of the amusements of the Chinese are at the present day of a nature so very puerile, or so gross and vulgar, that the tricks and the puppet-shows which are occasionally exhibited in a common fair of one of the country towns of England, may be considered as comparatively polished, interesting, and rational. In sleight-of-hand, in posture-making, rope-dancing, riding, and athletic exercises, they are much inferior to Europeans; but in the variety of their fireworks they perhaps may carry the palm against the whole world. In every other respect the amusements of the capital of China appear to be of a low and trifling nature, neither suited to the affected gravity of the government, nor to the generally supposed state of civilization among the people.

Of the fireworks exhibited at Gehol, Lord Macartney says, that in some particulars they exceeded any thing of the kind he had ever seen. In grandeur, magnificence, and variety, they were, he owns, inferior to the Chinese fireworks which he had seen at Batavia, but infinitely superior in point of novelty, neatness, and ingenuity of contrivance. One piece of machinery he greatly admired: a green chest of five feet square was hoisted up by a pulley to the height of fifty or sixty feet from the ground, the

bottom was so constructed as then suddenly to fall out, and make way for twenty or thirty strings of lanterns enclosed in the box to descend from it, unfolding themselves from one another by degrees, so as at last to form a collection of at least five hundred, each having a light of a beautifully coloured flame burning brightly within it.

This devolution and developement of lanterns, (which appeared to me to be composed of gauze and paper,) were several times repeated, and every time exhibited a difference of colour and figure. On each side was a correspondence of smaller boxes, which opened in like manner as the others, and let down an immense network of fire, with divisions and compartments of various forms and dimensions, round and square, hexagons, octagons, and lozenges, which shone like the brightest burnished copper, and flashed like prismatic lightning with every impulse of the wind. The diversity of colours, indeed, with which the Chinese have the secret of clothing fire, seems one of the chief merits of their pyrotechny. The whole concluded with a valcano or general explosion and discharge of suns and stars, squibs, bouncers, crackers, rockets, and grenadoes, which involved the gardens for above an hour after in a cloud of intolerable smoke.

RECREATIONS IN NATURAL PHILOSOPHY.

No. VI.

On Capillary Attraction (*concluded.*)

In our last article, we noticed several attempts to produce perpetual motion, made for the most part by men altogether unacquainted with the laws which regulate the phenomena of nature. It will not be uninteresting to notice a few plans proposed by distinguished scientific observers for effecting the same object. We will then conclude this article with a short account of some interesting phenomena connected with capillary attraction, not included in our former article.

The celebrated Bernouilli conjectured that the arrangement shown in fig. 1 would produce a perpetually flowing current. Within the bent part, F, of the siphon tube, is a filter of some kind: two liquids of different densities are mixed, and poured into the short end of the tube E, and the filter must be of such a nature as to allow one only of the liquids to pass through. Now, if the heights F E and F G, (or their equivalents C D and A B,) were inversely as the specific gravities, and the lighter of the two liquids passed through the filter, the long arm would become filled with the filtered light liquid, exactly when the short arm became filled with the heavier. But Bernouilli supposed that if F G were a little shorter than to answer the proportion just named, the liquid would reach G and begin to flow over before E was quite filled; and if allowed to flow back into E along the inclined channel, a perpetual current would be established. Such is Bernouilli's plan for a perpetual motion, but we are not aware that it has ever been put to the test.

Fig. 1.

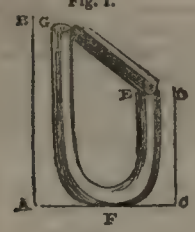
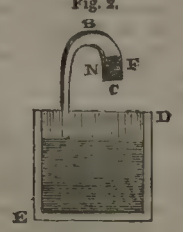


Fig. 2.

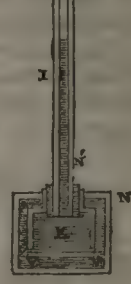


Another scientific plan is shown in fig. 2. E D is the section of a vessel containing water. A B is a capillary tube of so small a bore, that the water will rise up within it to the bent part B. B C is a portion of the tube of larger bore, so that the end C being dipped in water the fluid would rise to F. It was therefore supposed that when the whole tube was filled with water, and the end A dipped into the reservoir, the part B F would be kept filled with water which had flowed over the bend from A, and thus overcoming the capillary attraction at C F, would cause a constant flow from A to C, and so down again into the reservoir. This plan, like the former, is merely speculative, and does not seem ever to have been carried into practice.

Connected with capillary attraction is the curious subject of *endosmose*, or the attraction of a thin fluid by a denser one, through an animal or vegetable membrane. M. Dutrochet found that on partly filling the air-bladder of a carp with thin mucilage, tying it securely at the neck, and placing it in water, that it gained weight by attracting water through its pores: this he called *endosmose*, from two Greek words signifying *a forcing in*. Having filled a similar bladder with water, he placed it in thin mucilage, and found that it lost weight, the water being attracted through the pores of the membrane into the surrounding mucilage: this phenomenon he named *exosmose*, from two Greek words implying *a forcing out*. The same eminent observer has contrived an instrument called an *Endosmometer*, for estimating the degrees of force with which these remarkable actions take place. This instrument is shown in fig. 3, where I is a tube of glass fitting tightly into a vessel K, which is closed at the bottom by a membrane V V, or some porous substance whose powers of endosmose it is wished to examine.

We will suppose V V to be a membrane tightly stretched over the edges of the reservoir K, and fastened securely, so that no liquid can enter at the bottom except by traversing the pores of the membrane. If alcohol be poured into K, and the reservoir be placed and supported in water, as shown in the figure, so that the membrane may not touch the vessel containing the water, mechanical equilibrium will soon be established between the liquid in K and that in N, and the tension of the bladder, so that the alcohol will settle at a certain level in the tube, which we will suppose to be at N′, N being the level of the water in the outer vessel. But we shall soon mark a considerable change: in about a quarter of an hour the alcohol will have ascended considerably above N′, and will continue to ascend; so much so, that if the tube I be not sufficiently long, the liquid will, in the course of twelve hours, flow over at the top of the tube. It will, in fact, have ascended more than twenty inches within that time. M. Dutrochet says that a mucilage formed of water thickened with sugar, in the proportion of one part sugar and two of water, was productive of a power of endosmose capable of sustaining a column of mercury of 127 inches.

Fig. 3.



The remarkable experiment that we have just detailed, cannot be attributed to ordinary capillary attraction, which would scarcely be capable of maintaining the alcohol half or three-quarters of an inch above the exterior level. The water passes through the membrane to the alcohol in opposition to the hydrostatic pressure upon it, which is considerable, and causes the membrane to bulge outwards. The theory of endosmose is at present obscure; its discoverer assigns electricity as the cause; and M. Poisson, in an ingenious theory, endeavours to esta-

blish a new description of capillary attraction; but it would be out of place here to discuss the merits of either theory

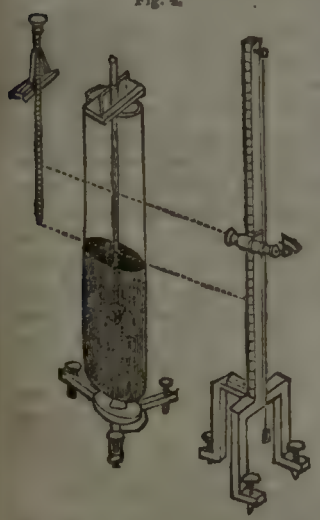
Although the facts of endosmose and exosmose are comparatively new to science, they have been practically known for a long time to a class of men which is unfortunately too numerous. The smugglers of spirits on the Continent enclose brandy in bladders, which they wear about their persons, concealed under their clothes. In this way bands of smugglers introduce brandy to places otherwise inaccessible to them: but they find that a skin full of the spirit, after having been worn about the person for several hours, has diminished in quantity but has wonderfully improved in quality. It is an old recipe, too, in pharmacy, for strengthening spirits of wine, to fill a bladder therewith and hang it up in a situation exposed to the air, for a week or two: water alone will pass out, and thus the spirit becomes stronger.

M. Dutrochet finds that in transmitting liquids through the tissue of plants, vegetables could be gorged therewith by placing them in water, and that they could be emptied again by placing them in a heavier liquid than that contained in them. He refers the motions of sap to endosmose; also the sleep of plants, and the directions taken by some of them when under the influence of certain agents, such as light, to the source of which most plants naturally turn.

The subject of capillary attraction is, undoubtedly, an important one, and it has, therefore, engaged the attention of many celebrated philosophers. In order to be better able to watch its phenomena, Gay Lussac contrived a complicated arrangement which we will briefly describe, merely to show the reader how much care is necessary to be bestowed by one who wishes to get accurate results in the investigation of this delicate subject.

Fig. 4 shows Gay Lussac's apparatus complete. A vessel containing the liquid is mounted upon a stand furnished with graduating screws, in order that the upper rim of the vessel may be made perfectly horizontal. The capillary tube is passed through a socket contained in a flat plate which rests upon the edge of the vessel: by this means the tube can be moved up and down. A few inches on one side of this vessel, is a graduated scale, mounted on a stand, furnished with adjusting screws and a plumb-line, in order that the scale may be made perfectly vertical. A small micrometer is attached to this scale, through which the level of the liquid in the capillary tube is observed. A graduated wire pointed at its lower end, and passing through a socket in a flat plate, is now placed in the vessel in such a manner that the point of the wire shall just touch the surface of the liquid as seen by the micrometer, which, sliding up and down on the scale, can be conveniently moved about. The liquid is now removed from the vessel in such a manner as not to disturb it in any way, and in such quantity that the column *in* the capillary tube shall descend, and its level exactly correspond with the point of the wire which was in contact with the surface of the liquid in the vessel. Thus, by observing the figure marked upon the scale at the first observation, and that obtained at the second when the pointed wire and the summit of the capillary column coincide, we get the precise length of such column above the liquid level included between the two figures marked upon the vertical scale.

Fig. 4.



OLD ENGLISH SUMPTUARY LAWS.

It is well known that in the reign of Elizabeth (and of her immediate successor, James I.), several sumptuary laws were enacted,—laws for limiting the expenses of dress. Elizabeth attached to regulations respecting articles of dress a degree of importance nearly equal to that of the monarchy itself. She issued numerous proclamations on the subject, and caused precepts to be sent to the companies, for the purpose of having her orders carried into effect. Thus, by her orders, in 1579, two members of the Ironmongers' company were chosen to attend, with two men free of the Grocers' at Bishopsgate, from seven o'clock in the morning till six in the afternoon. They were to examine the habits of all persons passing through the gate! But to do her majesty justice, she was not by any means so outrageous as his majesty King James, her successor. Some of his feats in putting down extravagance, are thus described:—"James exceeded Elizabeth in his love for these minutiæ. 'The abuse growing by excesse, and strange fashions of apparrell, used by manye apprentises, and by the inordinate pryde of mayde servauntes and woman servauntes, in their excesse of apparell and follye in varietie of newe fashions,' caused that decorous monarch such uneasiness, about the year 1611, that the mayor, by his orders, sent precepts to the wardens of companies, enjoining them to convene, and to harangue their several fraternities on this heinous sin. 'Mr. Warden Burrell,' on reading the precept to the Grocers' company, 'made sundrye godly and charitable exhortacions to each to see reformacion made in his owne familye, accordynge to the meaning of the same; and the common council afterwards embodied certain regulations into an act, in which every item of apparel to be worn, both by apprentices and maid-servants, with the kind of material composing it, or 'the stuffe, fashion, and goodnesse,' are detailed with the minuteness of a tailor or dressmaker. Apprentices were to wear 'no hat,' the facing whereof should exceed three inches in breadth in the head; or which, with the band and trimming, should cost above five shillings; the band was to be destitute of lace, made of linen, not exceeding five shillings the ell, and to have no work or ornament than a plain hem and one stitch. And if the apprentice should wear a ruff-band, it was not to exceed three inches in height before it was gathered and set into the stock, nor more than two inches in depth before the setting into the same stock. The collar of the doublet was to have neither 'poyet, well (whale) bone, or plaits,' but to be made close and comely, and, as well as the pantaloons, was to be made only of 'cloth, kersey, fustian, sackcloth, canvasse, English leather, or English stuffe,' and of not more than two shillings and sixpence the yard; his stockings were to be of woollen, yarn, or kersey, he was not to wear 'Spanish shoes with polonia heels;' or to have his hair with any 'tufte or lock, but cut short in decent and comely manner.' The London servant-girl was, if possibie, more restricted. She was to wear no 'lawn, kambrick, tiffany, velvet lawns, or white wires on the head,' or about 'the kerchief, koyfe, crest cloth, or shadow,' but only linen, and that not to exceed five shillings the ell. Her ruff was on no account, to be of more than four yards in length before the gathering, or settings in, or of greater depth than three inches; nor was she to 'wear any fardingal at all, great or little; nor any body or sleeves of wire, whalebone, or other stiffing(stiffening), saving canvasse or buckram only.'"

They take very unprofitable pains who endeavour to persuade men that they are obliged wholly to despise this world and all that is in it, even whilst they themselves live here: God hath not taken all that pains in forming, and framing, and furnishing, and adorning this world, that they who were made by Him to live in it should despise it; it will be well enough if they do not love it so immoderately, to prefer it before Him who made it.—Clarendon.

PHILOSOPHY OF THE HOUR-GLASS.

In olden time, long ere the art of clock-making was discovered, our ancestors marked the fleeting hours by the flowing of sand in a glass. This contrivance was called the hour-glass, and it is still very generally to be found upon the table of the public lecturer, or the private teacher, in the laboratory of the philosopher, or in the cottage of the peasant. It is a far more accurate measurer of time than is usually imagined; and, therefore, perhaps a short account of the theory of its action may be acceptable.

The investigation was undertaken a few years since by M. H. Bournand: his experiments are exceedingly curious, and merit to be more generally known. A few only of the most remarkable, and easy of performance, are detailed in the following notice.

The first remarkable fact regarding the hour-glass is, that the flow of its enclosed sand is perfectly equable, whatever may be the quantity contained in the glass, at any period of its flowing: or, in other words, that it runs no faster when the upper cone is quite full, than when it is nearly empty. This is contrary to what we might expect, for it would be natural enough to conclude, that when full of sand, the lowest particles would sustain a greater pressure from the incumbent mass, and therefore, be more swiftly urged through the aperture, than when only a quarter full, and near the close of the hour. The fact that the flow is equable, at any period, may be proved by a very simple experiment.

Provide a quantity of what is called *silver-sand*, (well known for domestic use), dry it upon a hot stove-plate, or in an iron ladle over the fire; then sift it through a tolerably fine sieve, carefully removing all lumps of clay or stone, which are frequently found in it. Next, take a tube of any material, length, or diameter, closed at one extremity, and in the bottom make a small aperture, say the eighth of an inch, place the finger over this, or stop it lightly with a small plug, and then fill up the tube with the sifted sand.

Hold the tube *steadily*, or affix it to a wall or a frame, at any convenient height from a table, and then removing the finger or plug, permit the sand to flow in any measure, for any given time—suppose into a common graduated glass measure—for a quarter of a minute. A certain quantity is thus obtained, which must be noted. Now let the tube be only a half or a quarter full of sand, and begin to measure again, for a like time, the same quantity of sand will flow; and even if by means of a ruler or plug, the sand in the tube is violently pressed upon, the flow of the sand from the aperture, will not, in the least degree, be accelerated, provided the tube is kept steady, and the experimental comparisons all accurately and fairly made. Now all this admits of a simple and satisfactory explanation. Sand, if allowed to fall quietly upon any surface, will form itself in a conical heap, having an angle of about 30°. This is seen in the lower cone of the hour-glass, or can be shown by letting the sand fall from the aperture of the tube just mentioned. Whenever a load of dry sand is thrown from a cart or barrow, or sifted through a screen by the builder in making mortar, it forms a like conical heap, having an angle of 30° or 35°. Now then observe the application of this fact of every-day occurrence; it will show how intimately "things familiar" are connected with practical science.

As sand thus falls at a determinate angle, it is easy to imagine that, when poured into the tube, it must fill it with a succession of conical heaps, and that all the *weight* which the bottom of the tube sustains, is only that of the heap which *first* falls upon it, and that the succeeding heaps are thus prevented from exerting any *perpendicular* pressure upon the bottom, but that they also exert a *lateral* pressure against the walls of the tube.

When pressure is applied to the top of the sand, it is only transmitted *laterally*, and that to a very little extent; consequently the lowest heap of sand enjoys its flow, uninfluenced by the strata or pressure above it. This is the reason why the sand in the hour-glass flows with such regularity; and that any given base sustains no weight of sand, but that of the first heap which falls upon it, and is in immediate contact with it, may be proved by taking a tube, about an inch diameter, open at both ends, wetting with the lips the edges of a small piece of tissue-paper, and applying this to one end of the tube, so as to form a bottom, held on by a very slight adhesion. Fill this tube carefully with any weight of sand, and the paper will not be forced away, not even if with a round ruler or rod, great pressure is applied to the top surface of the sand. All the weight of sand that the tissue-paper supports is the little heap which first falls upon it.

If the experiment is made upon a larger scale, with tubes three or four inches in diameter, and five or six feet long, it is better to paste the paper round the bottom, because the first heap, in such case, would be of considerable weight; but if the paper is strong enough to resist *it*, forty or fifty pounds of sand may be poured into the tube, and all lifted from the ground together, without the slightest fear of the paper being forced away.

The experiment admits of another modification. Take the tube open at both ends, and place one of them in contact with the bottom of a small cup, floating upon water, then fill up the tube with sand; none of it will run out into the cup: and that there is no perpendicular pressure is evident from the cup still continuing to float. It sustains no weight, save that of the first heap; the hand of the operator sustains the weight of all the rest of the sand. Draw away the tube, the sand then rushes into the cup, in obedience to the law of gravitation, and its weight causes the cup to sink.

From such experiments it may be concluded that it must be extremely difficult to *thrust* sand out of a tube, by means of a fitting plug or piston; and this, upon trial, is found to be the case. Fit a piston to a tube, (exactly like a schoolboy's pop-gun), pour some sand in, and try with the utmost strength of arm to push out the sand. It will be found impossible to effect this: rather than the sand should be propelled, the tube will burst *laterally*.

Directions are often given by naturalists for shooting birds with a charge of fine sand, so that their plumage may not suffer the damage which is usually occasioned by an ordinary charge of small shot. This proceeding ought to be made with considerable caution, for it must be evident, from the last experiment, that a charge of sand would resist the expansive force of gunpowder, and violently strain the barrel, perhaps burst it; to say nothing of goring and spoiling its polished interior by the rapid friction of the sand; and supposing it in very small quantity, and successfully propelled, it is certainly rather a hazardous experiment. To prove how a small column of sand will resist the expansive force of a large charge of gunpowder, it will be sufficient to instance the method adopted by engineers for blasting rocks.

A hole is drilled in the rock, of the requisite depth, at the bottom of which the charge of powder is placed: a long match, or reed, filled with powder, is then put down, and around this sand is merely poured in, so

as to fill the hole: a train is laid and fired, and presently the explosion takes place, rending away the mass of rock. The loose column of sand is not *blown out* of the hole, leaving the rock unshaken, but it keeps its place, until it compels the solid rock to yield unto its singular power.

The discoverer of these facts, relating to the flow of sand in the hour-glass, makes the following observations:

"There is perhaps no other natural force on the earth which produces by itself a perfectly uniform movement, and which is not altered either by gravitation, or the friction, or resistance of the air: for the height has no influence; *friction*, in place of being an obstacle, is the *regulating* cause; and the resistance of the air within the column must be so feeble as to be altogether insensible as a disturbing force."

[*Magazine of Popular Science.*]

BODY AND SOUL.

The free and active spirit, by which we think and act, hath properties which have induced the reasoners of every age and country, to allow it to be immortal. On looking into ourselves, on finding conscience, memory, and thought, in all its various modes, and wonderful methods of manifestation, working their several tasks independent of everything without, we derive from the very constitution of our being, from our own simple individual consciousness, a proof which not the sophistry of hell itself can gainsay, that our souls shall defy the power of time, and never be holden by the grave, or fall under the hand of death. The life of the soul is an essential life. Its motions are demonstrations of life, and its activity never ceases. No figure, no image of mortality applies to the soul. Though darkness may come over it, it diminishes not its energies; and though time may change its habits of willing or deciding, it makes no change in its state or constitution.

But vast is the difference when we look at the body; week, corruptible, and decaying, destitute of power, except that which is given it; motionless, till the mind gives it motion; unconscious, till the mind gives it consciousness; it partakes in all its habits and principles of the dull, gross matter, which forms the bulk of the unconscious earth. Time wears it like a blighting wind, disease twists and tortures its internal machinery, till the fabric falls to ruin: a little wrong mingling of its fluids, a momentary pause in the pulses of its organs, reduces it to a state of torpor. Then comes death, and in a few days, the brightest, the loveliest of forms, the countenance that won all hearts by its sweetness, the graceful, firm-set limb, that the sculptor and the painter would employ their best skill to imitate, are covered with the heavy dews of corruption. The hours have to be numbered, how long the wreck of humanity may be looked at by the human eye; and these nours are few. Decay hastens its work darkly and fearfully. The nerves of the strongest shrink at beholding its progress, and the frame broken up and marred, is hurried into the grave. There the forces of the earth operate around it; limb is let loose from limb; the eye falls from its socket; the shrivelled, or dissolving mass, becomes broken into clods, and in a little time the clod drops into formless dust. And taking a handful of that dust, and flinging it up into the air, we shall see that the wind will scatter it like the common dust of the highway; and then human reason may well ask, Is this the body of a man? And how shall the bodies of men arise? Let us consider the question; first, by the light of reason, and then, by that of the Gospel.

[Stebbing's *Discourse on Death.*]

DIALOGUE BETWEEN THE BODY AND SPIRIT.

Body.—Spirit! I feel that thou
Wilt soon depart.
This body is too weak longer to hold
The *immortal* part.
The ties of earth are loosening—
They will break;
And thou—even as a joyous bird,
Thy flight will take
To the eternal world.
Say, Spirit! say!
Wilt thou return again? once more illume
My house of clay?
Or must this body, which has been to thee
A temple and a dwelling-place,
Perish for ever, and forgotten be?
Spirit.—Yes! I must leave thee.
I am longing
For the communion of those blessed ones
Within the courts of heaven,
Who tune their golden harps
To the eternal praise of Him, who gives
That home above—
Which *they* have gained, and which I would attain,
Through Him who came to prove
That *God is Love*:
And by him too, I know that *thou*,
My earthly tenement,
Within the dust must lie,
And there turn to corruption,
Even as the seed doth die
To be revived again.
Death hath no power o'er the *soul*,
For Christ hath conquered—
The grave cannot retain its victims
When *He* cries—Come forth!
Then I return to *thee*—
The victory is gained—
For "*Christ hath made us free.*"—?

Women are formed for attachment. Their gratitude is unimpeachable. Their love is an unceasing fountain of delight to the man who has once attained it, and knows how to deserve it. But that very keenness of sensibility which, if well cultivated, would prove the source of your highest enjoyment, may grow to bitterness and wormwood if you fail to attend to it or abuse it.—Hogg.

Take care thou be not made a fool by flatterers, for even the wisest men are abused by these. Know therefore, that flatterers are the worst kind of traitors; for they will strengthen thy imperfections, encourage thee in all evils, correct thee in nothing, but so shadow and paint all thy vices and follies, as thou shalt never, by their will, discern evil from good, or vice from virtue: and because all men are apt to flatter themselves, to entertain the additions of other men's praises, is most perilous. Do not therefore praise thyself, except thou wilt be counted a vain-glorious fool, neither take delight in the praise of other men, except thou deserve it, and receive it from such as are worthy and honest, and will withal warn thee of thy faults; for flatterers have never any virtue, they are ever base, creeping, cowardly persons. A flatterer is said to be a beast that biteth smiling; it is said by Isaiah in this manner: *My people, they that praise thee, seduce thee, and disorder the paths of thy feet:* and David desired God to cut out the tongue of a flatterer. But it is hard to know them from friends, they are so obsequious and full of protestations; for as a wolf resembles a dog, so doth a flatterer a friend. A flatterer is compared to an ape, who because she cannot defend the house like a dog, labour as an ox, or bear burdens as a horse, doth therefore yet play tricks, and provoke laughter. Thou mayest be sure that he that will in private tell thee thy faults, is thy friend, for he adventures thy dislike, and doth hazard thy hatred; for there are few men that can endure it, every man for the most part delighting in self-praise, which is one of the most universal follies that be witcheth mankind.—Sir Walter Raleigh.

VARIOUS SPECIES OF THE ELEPHANT.

There is a greater difference than is generally supposed in the conformation of the two living species of Elephants, namely, the African and the Asiatic; and the fossil Elephant or Mammoth, in like manner, differs from both the others. The engravings represent the sculls of the three species. Fig. 1 is the head of the Mammoth; it is much more pointed on the summit than that of either of the other species; its trunk also must have been much larger, if we may judge from the size and prominence of the bony support to which it has been attached; there is also a great difference in the formation of the teeth, and the hide was thickly covered with coarse hair.

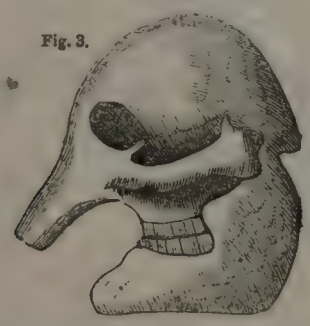
Fig. 1.

Fig. 2.

The head of the Indian Elephant, fig. 2, resembles the last species much more than the African in its great elevation, but it is distinguished by being more rounded at the summit; the bone which supports the trunk is also less prominent. The ears in this species are much smaller than those of the African Elephant, and the tusks do not grow to so great a size. In the female they are seldom to be seen without turning the lip on one side, and on this account it is generally believed that the female is unprovided with tusks.

The head of the African Elephant, fig. 3, is very different from the others, being much shorter and

Fig. 3.



rounder; the ears are extremely large and hang down the shoulders; it is much smaller than the last, and both sexes are furnished with very large tusks.

The native country of the Mammoth, and the cause of the destruction of its race, is a problem which, perhaps, will never be solved, but the remains of this stupendous creature have been found in almost every part of the northern hemisphere of the globe, in Europe, Asia, and America. When the enormous bones of this animal were first discovered, people were so little acquainted with comparative anatomy, that they were supposed to be the bones of giants; and designing men, taking advantage of this belief, exhibited collections of them for money. In 1613, some of these bones were found near the Chateau of Chaumont, in France, and a medical man named Mazurier, exhibited those which were perfect, at Paris and other places: to make the story more wonderful, his exhibition was accompanied by a little pamphlet, in which it was stated that they had been found in a tomb thirty feet in length, over which was the inscription (*Teutobochus Rex*,) the name of a king of the Cimbri, who fought against the Roman Marius.

The Indian Elephant is found on both sides of the Ganges, in the southern part of China, Java, Borneo, Sumatra, and all the larger East Indian islands; it has never been found in Africa, is larger than the African species, and appears to be much more readily tamed.

The African species is found in a great portion of that continent from the coast of Guinea to the Cape of Good Hope, but few attempts seem to have been made to force it to submit to the will of man, and it is chiefly sought after on account of the value of its ivory.

INDIAN TRADITION OF THE GREAT BUFFALO.

The following tradition of the American Indians, concerning the Great Buffalo, or Mammoth, of ancient days, is given by Mr. Peale, in his account of the fossil remains of the Mammoth found in North America, in 1801. As Mr. Peale remarks, "the language of this tradition is certainly English, and, perhaps, a little too highly dressed, but the ideas are truly Indian."

Ten thousand moons ago, when nought but gloomy forests covered this land of the sleeping sun; long before the pale men, with thunder and fire at their command, rushed on the wings of the wind to ruin this garden of nature; when nought but the untamed wanderers of the woods, and men as unrestrained as they, were the lords of the soil; a race of animals existed, huge as the frowning precipice, cruel as the bloody panther, swift as the descending eagle, and terrible as the angel of night. The pines crashed beneath their feet, and the lake shrunk when they slaked their thirst; the forceful javelin in vain was hurled, and the barbed arrow fell harmless from their side. Forests were laid waste at a meal; the groans of expiring animals were every where heard, and whole villages, inhabited by men, were destroyed in a moment.

The cry of universal distress at length extended even to the region of peace in the west, and the good Spirit interposed to save the unhappy. The forked lightning gleamed around, and loudest thunder rocked the globe! The bolts of heaven were hurled upon the cruel destroyers alone, and the mountains echoed with the bellowings of death.

All were killed except one male, the fiercest of the race, and him, even the artillery of the skies assailed in vain. He ascended the bluest summit which shades the source of the Monangahela, and, roaring aloud, bid defiance to every vengeance. The red lightning scorched the lofty firs, and rived the knotty oaks, but only glanced upon the enraged monster. At length, maddened with fury, he leaped over the waves of the west at a bound, and this moment reigns the uncontrolled monarch of the wilderness.

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A BRIEF HISTORY OF NAVIGA ON PART III.

A CARACOLE.

THE NAVIGATION OF THE MIDDLE AGES.

THE ARABIANS.

THE details, which have hitherto occupied our attention on the subject of Navigation, have had reference generally to periods prior to the final overthrow of the Roman empire, an event which has formed one of the most remarkable eras in the history of the world. It is scarcely too much to say, that, when the Roman empire was at the zenith of its greatness, the whole known world was subject to its sway; for we shall remember that the term "*known world*," will have a different signification at different times. America was then unknown:—Africa was then unknown, except those countries bordering on the Mediterranean and Red Seas; and also those countries which now rank for local extent as the largest in the world—India, China, and Russia, were almost entirely unknown in those times; so that nearly all, which were recognized as inhabitable and inhabited countries, were under Roman domination.

This gigantic power had, however, the seeds of dissolution within itself. Distant provinces could not be governed without the maintenance of armies in such numbers, and of such vast extent, that the mother country was first drained, and then served only by foreigners; and all the useful arts, whether agricultural, or otherwise, fell into decay. Besides this, the aspiring ambition of the different generals frequently led them to assume sovereignty on their own account, and to shake off the authority of the country which sent them out. The scriptural expression, that "a house, divided against itself, falleth," was fully verified in the case of the Roman empire; for the want of unity of purpose and of combined operation weakened this overgrown empire, and made her an easier prey to the barbarians of the north-east of Europe.

We shall now continue our sketch of the progress of naval affairs, from about the beginning of the sixth century.

About this period, the eastern, or Constantinopolitan portion of the dismembered Roman empire, was assailed by the Saracens, a nation occupying a portion of what is now called Arabia. Mathuvius, a Saracen chief, fitted out a powerful fleet and conquered the island of Cyprus in the Mediterranean, which had formerly belonged to the eastern empire, and then seized upon the island of Rhodes, from whence he conveyed away the materials, of which the famous Colossus of Rhodes had been formed. This stupendous figure was made of brass, and passed for one of the seven wonders of the world. Its feet were upon the two moles at the entrance of the harbour, and ships passed in and out in full sail beneath it. It was about one hundred and five feet high. It did not stand many years before it was overturned by an earthquake, 224 B.C.: and, as the Rhodians had a superstitious opinion that it should never afterwards be used for any other purpose, they allowed the fallen statue to remain on the ground: the Saracens, however, had no such scruples; they broke up the statue, and loaded nine hundred camels with the metal, which they sold to a Jewish merchant for 36,000*l.* English, It is related of this image, that a winding stair-case ran to the top, from which the distant shores of Syria, and the ships of Egypt as they traversed the bay of Alexandria, could be discerned by means of glasses suspended from the neck of the statue. It had remained in ruins for nearly 900 years, although the people of Rhodes had collected large sums of money for its repair. This money, however, they seem to have appropriated; which was, perhaps, the true reason why they feigned or felt reluctance to raise up the image, and pretended that the oracle of Delphi forbade it.

When the Arabians, in their rapid career of conquest, had reached the Euphrates, they immediately perceived the advantages to be derived from an emporium situated upon a river, which opened on the one hand a shorter route to India than they had hitherto had, and on the other, an extensive inland navigation through a wealthy country; and Bassora, which they built on the west bank of the river, A.D. 636, soon became a great commercial city, and entirely cut off the independent part of Persia from the Oriental trade. The Arabian merchants of Bassora extended their discoveries eastward, far beyond the tracks of all preceding navigators, and imported directly from the place of their growth, many Indian articles, hitherto procured at second hand in Ceylon; which they accordingly furnished on their own terms to the nations of the West.

The victorious Arabs, by these events, had now deprived Heraclius, the emperor of the East, of the wealthy, and in some degree, commercial province of Syria. The little commerce now remaining to the Roman empire also fell

into their hands, with the city of Alexandria and the province of Egypt: and the road from Egypt to Medina was covered by a long train of camels, loaded with the corn which used to feed the city of Constantinople.

A few years afterwards, the ancient canal between the Nile and the Red Sea is said to have been cleared out, and again rendered navigable, by Amrou, the Arabian conqueror and governor of Egypt, in order to furnish a shorter and cheaper conveyance for the corn and other bulky produce of the country.

Fresh attempts were also made by these people to connect the Mediterranean and Red Seas by means of a navigable canal; a purpose sought to be accomplished in various ages of the world, by people who have given their attention to maritime affairs. The continent of Africa is a peninsula, connected with Asia by the Isthmus of Suez, which is about sixty miles long, and consists of sand. Many thousands of human beings have perished at different times in labouring to cut through this neck of land. The Ptolemies of Egypt, the Greeks, the Romans, and the Saracens, have all attempted, but failed, to effect the object. The French, when in Egypt, traced out the ancient line; and the union of the two seas has been deemed, in modern times, to be quite feasible; and many plans have been proposed for resuming the work.

A long series of naval operations, in which the Saracens were concerned, succeeded, which we need not detail: but about the year 670, the Arabians, or Saracens, whose fleets now rode triumphant in the Mediterranean, and who had already taken possession of Cyprus, Rhodes, and many of the Grecian islands, laid siege, for the first time, to Constantinople. For seven years they annually renewed the siege by sea and land, with varying success, but were ultimately repulsed, after the loss of 30,000 men and most of their ships. Their defeat was, in a great measure, brought about by the invention of a peculiar mode of offensive warfare, called the *Greek fire*; which was then used for the first time by Callinicus, a Syrian Greek. Gibbon supposes that it consisted principally of naphtha, a kind of liquid pitch, which springs out of the earth, and catches fire when a light is applied to it: this was mixed with sulphur, and a kind of turpentine extracted from evergreen firs. Sometimes it was poured down from the ramparts from large boilers; sometimes javelins and arrows were wrapped round with tow dipped in this mixture; and at other times it was deposited in fire-ships, from which it was, by some contrivance, blown upon the enemy through long tubes. When once kindled, nothing could stop the flame: water fed, instead of damping it. The secret of its composition was not known to other nations for four hundred years.

A. D. 730. The Christians of Europe were excluded from almost every channel by which the precious goods of the East had formerly been conveyed to them. An inveterate antipathy, heightened by mutual slaughters, and inflamed by religious bigotry, which made the Christians consider the Mahometans as the enemies of God, while they, on the other hand, abhorred the Christians as infidels, was almost an insuperable bar to commercial intercourse. But the mutual alienation produced little or no inconvenience to the Saracens, who found an ample scope for commercial enterprise within the vast extent of their own dominions. The scanty supply of oriental goods from the fairs of Jerusalem, and perhaps a few other privileged places, being very inadequate to the demand, some Arab merchants were tempted by the increased price, to traverse the vast extent of Asia in a latitude beyond the northern boundary of the Saracen power, and to import by caravans the silks of China, and the valuable spices of India; which, with the expense and risk of such a land carriage, must have cost a most enormous price when they reached Constantinople, where they were, notwithstanding, eagerly purchased by the luxurious and wealthy courtiers, whose demands for silk the manufacturers of Greece were not capable of supplying to their full extent.

About the year 850, Solyman, an Arabian merchant, wrote an account of the state of the maritime commerce between the Arabians, Chinese, &c., from which we obtain the following particulars.

The Arabian merchants had, by this time, extended their commerce and their discoveries in the East, far beyond the utmost knowledge of their own ancestors, the Greek merchants of Egypt, or the Ethiopian merchants of Aduli. Their vessels now traded to every part of the Asiatic continent, as far as the south coast of China, and to many of the islands. Solyman gives the following account of the Chinese, of whom scarcely anything was at that time known to the western world. "When foreign vessels arrive at Can-fu, (supposed to be Canton,) the Chinese take possession of their cargoes, and store them in warehouses till the arrival of all the other ships which are expected, whereby they are sometimes detained six months. They then levy a tax of thirty per cent. on the goods in kind, and restore the remainder to the merchants. The emperor has a right of pre-emption, but his officers, fairly and immediately, pay for what he takes at the highest price of the articles. Chinese ships trade to Siraf by the Persian Gulf, and there take in goods brought from Bassora, Oman, and other places, to which they do not venture to proceed on account of the frequent storms and other dangers in that sea." From the account of their route, which is constantly along the shore, the Chinese of this age appear to be rather more timid navigators than the Arabs and Egyptian Greeks were, many centuries before. Sometimes there were four hundred Chinese vessels together, in the Persian Gulf, loaded with gold, silks, precious stones, musk, porcelain, copper, alum, nutmegs, cloves and cinnamon.

At the period to which these accounts refer, the Arabians had removed their principal seat of commerce almost entirely to the Persian Gulf.

We should observe here, that Oman is the most eastern part of Arabia, whence the Gulf of Persia, which separates Persia from Arabia, is sometimes called the Gulf of Oman. It is sometimes called the Green Sea, from the appearance of its water. Beautiful pearls were obtained from these parts, to which the poet alludes in the mournful song of the Peri:—

> Farewell—farewell to thee, Araby's daughter!
> (Thus warbled a Peri beneath the dark sea;)
> No pearl ever lay, under Oman's green water,
> More pure in its shell than thy spirit in thee.

Here also was said to be found the star-fish, which was luminous, referred to by the same poet of Nature, when singing the dirge

> Of her, who lies sleeping among the pearl islands,
> With nought but the sea-star to light up her tomb.

The western boundary of Arabia was the Red Sea, the strait or passage into which was termed by the old Asiatic navigators, "*the gate of tears*:" for, owing to the danger of the navigation in these parts, and the many shipwrecks which occurred, the early Arabians reckoned as dead, and wore mourning for, all who had the boldness to hazard the voyage through it into the sea north of the Indian Ocean.

It is curious also to observe that, according to the reports of the ancient Arabs, the whale was formerly a frequent visiter of the Persian Gulf. It is narrated by some navigators that they saw there the strangest sight which they had ever beheld, which was the head of a fish, "that might be compared to a hill: its eyes were like two doors, so that people could go in at one eye and out at the other." When the Grecians under Nearchus, as noticed in our former paper*, had an opportunity of measuring a whale in these parts, they found it to be about ninety feet long, with a hide almost two feet thick, covered with shell-fish, barnacles, and sea-weeds, and attended by dolphins larger than they had seen in the Mediterranean.

The west side of the Red Sea appears, about the end of the ninth century, to have been deprived of all foreign trade. The vessels from Siraf by the Persian Gulf, (and we hear of none from India,) delivered their cargoes at Judda, or Jidda, an Arabian port, which appears to have been not used when the Periplus of the Erythrean Sea was written. From thence the goods destined for Egypt, Europe, and Africa, were forwarded in vessels conducted by people acquainted with the navigation of the Red Sea, the many dangers of which deterred the foreign navigators from proceeding any further in those parts. We are told that the Red Sea coasters carried the goods to Cairo, which had now superseded Coptos, as the general deposit of merchandize upon the Nile; and if that be strictly true, the vessels must have proceeded through the canal, which was restored by Amrou, the Arabian conqueror of Egypt. Thus we find the trade of the Red Sea nearly fallen back to the state in which it was under the first Ptolemies; and also, if we except the conveyance by the canal, nearly in the state in which it has been for several hundred years past. The efforts which are now making, however, by the English, and by the enterprising Pacha of Egypt, to render the Red Sea a channel of communication between Europe and the East, promise to make those regions once more a busy scene of naval traffic.

* See *Saturday Magazine*, Vol. XI., p. 205.

The Saracens continued for a long period to maintain a naval superiority in the Mediterranean, whether for the purposes of war or of commerce. Some of the Saracenic vessels were of a very large size. About the year 970, Abderahman, the Saracen Sultan or Caliph of the greater part of Spain, built a vessel larger than had ever been seen before in those parts, and loaded her with innumerable articles of merchandize, to be sold in the eastern regions. On her way she met with a ship carrying despatches from the emir of Sicily to Almoez, a sovereign on the African coast, and pillaged it. Almoez, who was also sovereign of Sicily, which he governed by an emir or viceroy, fitted out a fleet, which took the great Spanish ship returning from Alexandria, loaded with rich wares for Abderahman's own use. Many other instances of ships of a very large size having been constructed by the Saracens, have been recorded; and it has been suggested as probable, that it was in imitation of those ships that the Christian Spaniards introduced the use of large ships, for which they were distinguished down to the time of Philip the Second, whose "Invincible Armada" consisted of ships much larger than the English vessels opposed to them.

As an instance of the depressed state of human knowledge during the middle ages, we may mention that Cosmas, a Greek merchant of the sixth century, wrote a book called *Christian Topography*, the chief intent of which was to confute the heretical opinion of the earth being a globe, together with the pagan assertion that there was a temperate zone on the southern side of the torrid zone. He informed his readers that, according to the true orthodox system of cosmography, the earth was a quadrangular plane, extending four hundred courses, or days' journeys, from east to west, and exactly half as much from north to south, enclosed by lofty mountains upon which the canopy or vault of the firmament rested: that a huge mountain on the north side of the earth, by intercepting the light of the sun, produced the vicissitudes of day and night; and that the plane of the earth had a declivity from north to south, by reason of which the Euphrates, Tigris, and other rivers running southward are rapid; whereas the Nile, having to run up-hill, has necessarily a very slow current. Many other specimens of the blending of truth and fiction, or of the propagation of the latter alone, may be afforded. Massudi, who wrote a general history of the known world in the year 947, compares the earth to a bird, of which Mecca and Medina are the head, Persia and India the right wing, the land of Gog the left, and Africa the tail.

But the most celebrated of the Arabian geographers was Al Edrisi, who flourished in the twelfth century. He divides the world into seven climates, beginning with the equator and going northwards; these climates are distinguished by lines running from west to east, which resemble the lines of latitude on a modern map or globe. The mechanical division of the earth into climates was continued for many ages, until the accuracy of modern science came to adopt the parallels of latitude for marking off breadths on the earth's surface. This geographer supposed the earth to float in the ocean "like an egg in a basin of water." By his system he showed

> ..... the world
> Built on circumfluous waters calm, in wide
> Crystalline ocean.

This ocean was considered, according to the prevalent notion, to be surrounded by clouds and thick darkness. He further says that, owing to the impossibility of passing the equator by reason of the heat, the known world consists of only one hemisphere, partly land and partly sea, all which is surrounded by the great sea, or ocean, as has just been mentioned.

During these ages the Arabs visited the Chinese and the far-off nations of the East; and accounts of their intercourse with these people are handed down by various authors. These relations embrace not merely mercantile affairs, but observations of life and manners. One writer, speaking of the use to which the cocoa-nut is applied, says, "There are people at Oman, who cross over to the islands (the Laccadives) that produce the cocoa-nut, carrying with them carpenters' and all such tools; and having felled as much wood as they want, they let it dry, strip off the leaves, and with the bark of the tree they spin a yarn, wherewith they sew the planks together, and so build a ship. Of the same wood they cut and round away a mast; of the leaves they weave their sails, and the bark they work into cordage. Having thus completed their vessel, they load her with cocoa-nuts, which they bring and sell at Oman. Thus from the cocoa-nut tree alone so many articles are convertible to use, as suffice not only to build and rig out a vessel, but to load her when she is completed and in trim to sail." The preparation of thread from the fibres of the cocoa-nut was a great source of trade with many of these islands. The nut is softened in water, and afterwards beaten with a mallet till it becomes quite flexible, when the fibre is spun out and twisted into ropes. The thread was used in compacting the ships of Arabia and India.

The ships of India were, in old times, launched by means of elephants. It is related that one of these animals, being directed to force a very large vessel into the water, found the task exceed his strength; whereupon his master, in a severe tone, ordered the keeper to take away the lazy beast and bring forward another: the poor animal upon this instantly renewed his efforts, and in so doing fractured his skull and died upon the spot.

The Arabians seem to have carried their exploratory endeavours into all regions and in all directions. Russia and its inhabitants are described, as people of more modern times have found them in the earlier state of their civilization. The daring of the Arabs was bounded by the Northern Ocean, which they termed "the sea of pitchy darkness." India was visited regularly, and the Hindoos served in a nautical and commercial relation, for the Hindoos had a superstitious horror of the sea. The interior parts of Africa likewise were sought out and described; and although fable may have insinuated itself into the more veracious narrative of the geographer and historian, yet enough remains to make us believe that attempts were made, if not absolutely followed up by success, to proceed on westward, and to reach some strange, wonderful, and immeasurably distant regions, which should be an eternal recompense to the daring and skilful mariners who should guide their prows to those shores.

There belong to Welsh history some traditions respecting the adventures of Madoc, a prince of North Wales, who is said to have first discovered America at the latter end of the twelfth century. Owing to certain domestic contentions about the sovereignty, Madoc determined, as runs the thread of these traditions, to go out voyaging to a great distance, when he had procured men and ships with all necessaries. The ancient Britons were said to be very proficient in the art of navigation and all things pertaining thereunto. When they had been many weeks at sea, and had been much tossed about, they, at length, to their great joy, discovered land, which seemed at first sight like a cloud resting upon the distant waters. Seeing that it was quite steady, they concluded it to be land, and sailing towards it found it to be a fertile and pleasant country. Here they settled, and in course of time Madoc returned to Wales, and brought from home fresh men and ships, by means of which he stocked the country, and they all settled there; and he and the other adventurers were subsequently forgotten by the mother-country.

It is supposed that the part of the world which Madoc arrived at was a part of the vast continent of America, which the Spaniards appear to have afterwards first found out. The especial reason, which induces the moderns to consider the story of Madoc to be essentially true, is that so many of the words used by the Indians of those regions were found to be similar in sound and signification to the Welsh; this has led to those people being called Welsh Indians. They live about the fortieth degree of north latitude, and have been thrown back more westward by the encroachments of the Americans of the States. They were originally called Padoucas, or White Indians. We will now turn to the very remarkable narrative of Lieutenant Roberts, which, being coupled with the tradition cited above, will help us a good way to account for the early populating of America.

"In the year 1801," says he, "being at Washington, in America, I happened to be at a hotel smoking my cigar, according to the custom of the country, and there was a young lad (a native of Wales), a waiter in the house, who displeased me by bringing me a glass of brandy and warm water instead of cold. I said to him jocosely, in Welsh, 'I'll give thee a good beating.'

"There happened to be at the time in the same room one of the secondary Indian chiefs, who, on my pronouncing these words, rose up in a great hurry, stretching forth his hand at the same time; and the chief said that it was likewise his language, and the language of his father and mother, and of his nation. 'So it is the language of my father and mother, and of my country.' Upon this the

ANGLO-SAXON SAILOR'S HAMMOCK.

SAIL-MAKER, FROM AN OLD FRENCH PRINT.

Indian began to inquire from whence I came? I replied, 'from Wales;' but he had never heard a word about such a place. I explained that Wales was a principality in a kingdom called England. He had heard of England and of the English, but never of such a place as Wales.

"I asked him if there were any traditions among them from whence their ancestors had come. He said there were; and said that they had come from a far distant country, very far in the East, and from over the great waters. I conversed with him in Welsh and in English; he knew better English than I did, and I asked him to count in Welsh. He immediately counted to a hundred or more. He knew English very well, because he was in the habit of trading with the English Americans. Amongst other things, I asked him how they came to retain their language so well from mixing with the languages of other Indians. He answered, that they had a law, or an established custom in their country, forbidding any to teach their children another language until they had attained the age of twelve years, and after that age they were at liberty to learn any language they pleased. I asked him if he would like to go to England or Wales. He replied that he had not the least inclination to leave his native country, and that he would sooner live in a wigwam than in a palace. He had ornamented his arms with bracelets, and on his head were placed ostrich feathers.

"I was astonished and greatly amazed when I saw and heard such a man, who had painted his face of a yellowish red, and of such an appearance, speaking the language as fluently as if he had been born and brought up in the vicinity of Snowdon. His hair was shaved, excepting round the crown of his head, and there it was very long and neatly plaited; and it was on the crown of the head he had placed the ostrich feathers which I mentioned before, to ornament himself."

The foregoing description, though not strictly applying to the labours of the Arabs, has been introduced, a little in advance of its proper place; for a taste for Western discovery certainly was common at one time among the Arabs, and the sea-girt countries of Europe, about seven or eight hundred years ago.

Two Arabian geographers, Ibn El Vardi and Al Edrisi, who is mentioned before, give a curious account of a voyage made on the Atlantic Ocean or Sea of Darkness, by the *Almagrurim*, or the *Wanderers*. It appears from the Arabian narratives that these persons determined to find the ends of the ocean, and the great western regions, which seems to have been, in the European parts of the world, the great and mystic goal of daring. This voyage took place about the middle of the twelfth century, and therefore just before Madoc's. They set out from Lisbon, and kept sailing straight on to the west, in a vast and deep sea, for twenty-three days, when the wind took them southward to the Sheep-Island. The flesh of the sheep on this island was too bitter to be eaten. But having refreshed themselves at this place and taken in water they kept on to the south, and arrived among some red Indians, as it has been supposed, whose chief dissuaded them from pursuing any further the horrors of the gloomy sea, which lay to the west. Upon this they returned to Lisbon; not having, in fact, carried their voyage, as most people reasonably believe, beyond the Azores, and then southward, the Madeira and Canary Islands. They reported upon their return, that they had been visited with a storm, wherein they had lost the light of day,—that they had reached the gloomy extremities of the world,

> ....."where bounds were set
> To darkness, such as bound the ocean-wave.

Ibn Batuta, who set out on his travels at the beginning of the fourteenth century, has left an interesting account of his perambulations by land. But, as these do not come within the scope of our subject, we must omit them, and take up with those parts of his narrative, which appertain to maritime affairs. Having been despatched from Delhi as ambassador to China, he notices the Chinese junks at Calicut, which is in the south-western part of Hindostan. The description, which he leaves of these vessels, is applicable to them, both in past and present times; and is held to be very accurate. "The sails of these vessels are made of cane reeds, woven together like a mat; which, when they put into port, they leave standing in the wind. In some of these vessels there will be a thousand men, six hundred of them sailors and the remainder soldiers. Each of the larger vessels is followed by three others of inferior sizes. These vessels are nowhere built except in the farthest ports of China. They are rowed with large oars, which may be compared to great masts, over some of which five and twenty men were stationed, who work standing. The commander of each vessel is a great emir. In the large ships, too, they sow garden-herbs and ginger, which they cultivate in cisterns ranged along the side. In these also are houses constructed of wood, in which the higher officers reside with their wives: every vessel is, therefore, like an independent city. Of such ships as these Chinese individuals will sometimes have large numbers, and, generally speaking, the Chinese are the richest people in the world*."

These junks are almost innumerable on all the rivers and canals of the Chinese empire. The cane, referred to by Ibn Batuta, was the bamboo, of which the masts and arms were formed. These vessels do not sink more than a foot or half a yard into the water. They, are, however so ill contrived for sea, that it is wonderful how they can complete a voyage. The head is square, the bottom flat, having no keel, nor bow-sprit. The sails are lowered by the men treading them down with their feet. This craft is highly ornamented with dragons' heads, ugly mouths, and staring eyes, and does not usually venture upon a voyage farther than the Molucca or Spice Islands, and Port Jackson.

It is worthy of remark that the mountains of Lebanon, which had furnished timber for building the ships of Tyre and Sidon, in the infancy of navigation, were still the great nursery for ship-timbers, in the seventh and eighth centuries of the Christian era: vast stores of this timber being collected on the coast of Phœnicia by the Saracens, for building their fleets.

Before we take leave of this general account of the nautical proceedings of the Arabians, we have to observe that, in addition to the pursuit after land lying at the extremity of Atlantic darkness, a still greater object of curiosity to the Saracens, or Arabs generally, was the seat of Gog and Magog. All that we can in fact learn about these objects from the early history of the Bible and from Scriptural aids, is, that they were terms, implying a mighty race of cannibals on the shores of the Euxine and Caspian seas. In the Guildhall of London they stand as awful giants,—said to be twin-born, inseparable in name and estimation. These notions were derived from the fancies of the Orientals, who

* See *Saturday Magazine*, Vol. X., p. 162.

supposed that Gog and Magog had impregnable castles on the borders of Scythia. As the alchymist sought after the philosophers' stone, and the youth-restoring draught; as the astrologer computed the fates and fortunes of individuals and of states by the aspects of the heavenly bodies; and as the mechanician amused himself by seeking the perpetual motion, so also the Arabian navigators were anxious to explore the ideal abodes of these monstrous productions of antiquity. But, as the alchymist by his labours indirectly advanced the knowledge of chemistry—as the astrologer unwittingly furthered the progress of astronomy,—and as the seeker after perpetual motion increased the knowledge and practice of mechanics by his contrivances to attain perpetual motion—so the Arabian navigator enriched the knowledge of geography by his careful though futile search after mere creatures of the imagination. In fact, the search for Gog and Magog was at this time, about six or seven hundred years ago, part of the romance of navigation, which was indirectly beneficial to nautical science and a knowledge of the world: for, wherever the Arabs gave their attention to make observations, geographical knowledge was enlarged; and it is to be regretted that their religious bigotry deterred them from visiting and examining those nations, whose faith differed from their own.

The prosecution of the search after Gog and Magog was at this time an object of the greatest care and anxiety to the government of Bagdad. They hoped at first to find the residence of these giants on the shores of the Caspian Sea; but having conquered this country without discovering any trace or vestige of the castles of these awful beings, they turned to the more southern countries, which when they had explored with the greatest care and attention, they were reduced to excessive perplexity. Another mission was sent out, (we are told by Al Edrisi,) with strict orders to spare no pains to discover the castle of Gog. The people of this mission proceeded along the shores of the Caspian, then over a vast desert, where they met with a stupendous range of mountains, supposed to be the Altaian. Here, according to their report, they actually found the castles of Gog and Magog. It has been supposed that they discovered some of the ancient monuments which have since been seen among these mountains, and that thus they readily jumped to the conclusion that these were at least the ruins of what they sought; incited also, perhaps, by a wish to come to the conclusion of a task so strange and dangerous. The account they gave of the fortress of the giants was such as to impose upon those to whom they had to relate it, and was decked with all the hyperbolical garnishing of eastern imaginations. The castle had walls of iron and was of an enormous magnitude. The iron was cemented with brass. The gates were ninety feet high, and fastened with bolts and bars of a tremendous size. Everything else was related after a similar proportion; and thus the Arabian authorities were satisfied: having demanded wonder they received it; and their minds went to rest, when their fancies had been tickled. In all the maps of Asia for ages after, the castle of Gog and Magog appeared of an imposing aspect at the northern boundary.

THE ENGLISH.

Next in order, we must notice the history and general proceedings of our ancient countrymen in nautical affairs for a few hundreds of years, taking notice, in the course of our narrative, of the other distinguished nations of Europe, which, by their nautical skill and enterprise, as also by their commerce, increased the geographical knowledge of the world, and contributed to the comfort and well-being of the human race.

The British ships, which vainly strove to oppose the progress of Julius Cæsar, were made with bottoms flatter than the Mediterranean vessels, in order to accommodate themselves to a tide harbour and a shoal coast; and they were elevated both at the prow and the poop, which was deemed better adapted to resist a stormy sea. They were constructed wholly of oak; the anchors were secured by iron chains, instead of the cables which had been previously used; and the sails were made of skins and thin leather, probably from an opinion that a weaker material would not stand the force of the wind. The elevated poops of the British vessels gave them an advantage over the Roman galleys, by furnishing a higher standing-place, from which missiles could be directed at the Roman galleys. The oak construction of the British vessels also afforded a successful resistance to the collision of the beaks of the galleys against their sides, and the only way in which Cæsar was enabled to capture these vessels was the following:—the Roman soldiers fitted sharp bill-hooks at the end of long poles, and catching hold of the ropes which fastened the sails of the British vessels to the mast, cut them asunder, and thus rendered the sails useless.

These were the British war-ships at the period of the Roman invasion, but the natives used to cross the English and Irish Channels in vessels constructed of wicker-work, and covered with skins. Boats called *coracles*, very much resembling them in form, and which we noticed in our first paper*, are in use at the present day on the Severn, and some of the rivers in Wales; and they are so light that, when the fisherman lands, he takes his boat out of the water and carries it home on his back. Dr. Southey says, —"Several canoes have been dug up in Lincolnshire, all of oak, and remarkable for the free grain of the timber; so that the millwrights and carpenters who examined it, declared that, in their opinion, it was of foreign growth, and the produce of a warmer country. But that the canoes could not have been brought there from any warmer country seems certain: and if any inference can be drawn from the grain of the wood, as indicating its growth in a warmer climate, it would seem to be, that these canoes were made when the climate of the island was warm enough for elephants, hyænas, tigers, hippopotami, and other inhabitants of southern countries, whose remains have been brought to light here."

In like manner, we are told, the Saxon pirates, who cruised in the German Ocean, and subsequently invaded Britain, had ships made with a wooden keel, the sides

* See *Saturday Magazine*, Vol. XII., p. 34.

ANGLO-SAXON SHIP.

NORMAN SHIP.

being of wicker, with an exterior of hides. The *batswan*, or boatswain, had a wand in his hand to direct the motion of the rowers.

During the sanguinary conflicts in which the Britons were engaged, first with the Romans, then with the Picts and Scots, and afterwards with the Danes and Saxons, it does not appear that any great change was made in the form or management of their war-galleys. When Alfred the Great had routed some of the Danish invaders, they resolved to harass the coast of Wessex by sea, in revenge for the defeats they had met with by land. These predatory expeditions were made in vessels called *æscs*. The general boats of the Danes were broad-bottomed, but, unlike the early British boats, their keels were framed of light timber, and the sides and upper works were of wicker, covered with strong hides: they were, in fact, coracles of a larger size, and with wooden keels. The æscs were superior to these, and indeed to Alfred's ships, for he ordered the latter to be made twice as long as the former, in order to be placed on an equality with them. Some of the æscs had upwards of sixty oars, and were swifter, higher, and steadier than the coracles.

The character of the fierce and ruthless Danes, who, for so long a period, harassed the unhappy inhabitants of Britain, forms a very remarkable instance of what different members of a family are obliged to do, when the eldest son assumes the power and wealth of the father. In our own days, we know that it is customary, in eastern countries, for a sultan, as soon as he ascends his throne, to cause all his brothers to be put to death, in order that they should offer no opposition to his retention of the crown. This cruel and sanguinary line of conduct, although more directly wicked and censurable, was not, ultimately, more productive of evil than was the plan adopted among the early Danes. The shores of the Baltic Sea were parcelled out into a number of petty territories, each of which had its chief or sovereign. When a son of any one of these chiefs succeeded his father on the throne, his brothers had each a vessel given to them, in which they were to seek their fortunes: they became a sort of pirates, and, under the name of Vikingers, they became the terror of surrounding countries. So hardy and ferocious were they, that it was a proud boast of theirs, that they never slept under a roof, and never ate by a fireside. Their vessels used to scour the Baltic and the German Ocean, and bring devastation to all around. Thus we see that the first employment of the German Ocean, as a field for navigation, was to bear the rude vessels of lawless marauders, who were equally indifferent to the laws of God and of man. They have formed the heroes of many a Northern romance, under the general title of *Sea-Kings*. The Danes and Norwegians, generally, in the early accounts of nautical and predatory excursions, come under the denomination of *Northmen*.

The piratical adventurers of the northern coasts of Europe doubtlessly advanced the maritime art somewhat in the first centuries of the Christian era, and in time lent their assistance to the different governments, who needed and sought the aid of those who were acquainted with the deep sea, and the means for traversing it. Offa, one of the Saxon kings, got together a very fair fleet, and made himself so formidable, that Charlemagne, king of France, who had been hostilely disposed towards him, now sought his friendship and alliance. His successors took no heed to keep up this fleet, and thus suffered the country to lie exposed to the piratical attempts of the Danes, who robbed and murdered the English, and settled where they pleased. The facility with which the Danes landed and effected their purposes of pillage and slaughter, shows that the English, up to the time of Alfred, in the ninth century, were very ignorant, or very regardless, of maritime affairs. King Alfred, seeing that the most effectual method of repressing the inroads of the Danes was to meet them on the seas, invited ship-builders from other countries, and made ships larger and more compact than those of the Danes. He also drew many of the mariners of the Rhine into the service of England, whereby the ships were more efficiently manned. In the year 873 we learn that Alfred's navy attacked and destroyed a Danish fleet of 120 ships. We are also told that he greatly encouraged commerce, as a method of practising his subjects in the art and difficulties of shipping.

Before we speak of the Norman conquest of England, we may mention a law that was made by Athelstan, that "every merchant that made three voyages to the Mediterranean on his own account, should be raised to the honour, and enjoy the privileges, of a gentleman." This law seems to imply, that a considerable improvement had taken place in the construction and management of English vessels, and that they were probably used for the more peaceful object of commerce, as well as for the more common, but destructive one, of war.

King Edwy, who ascended the throne of England shortly afterwards, appears to have made a great increase in his naval force, for it is said that his navy amounted to 3000 vessels, which, however, some modern writers think ought to be interpreted 300. This fleet was divided into three sections, which were constantly circumnavigating the island, as a defence against hostile fleets. It is stated that, in the reign of Ethelred, whoever possessed a certain number of hides of land, should be charged with the building of one ship or galley, and owners of a portion of a hide, a proportionate part; the hide of land then alluded to, is believed to be as much ground as a man could turn up with one plough in a year.

EARLY ENGLISH WAR-BOAT.

Edgar, in the year 959, equipped a fleet of as many, it is said, as 3000 vessels, in order to defend the kingdom against the Danes. By dividing and stationing this fleet in different parts, he awed the enemy and secured the kingdom from depredation; but, owing to these precautionary measures being gradually neglected, the Danes, with their king, Sweyn, in the year 1009, were able to land on the English coast, to drive Ethelred from his throne, and to place their own monarch thereon.

The son and successor of this Danish monarch was Canute, who is distinguished in our history, particularly by his giving his courtiers a lesson of humility, by affecting to command the waves of the sea to obey his pleasure. Our nation must, in the long run, have been improved, as far at least as naval affairs were concerned, by intercourse with the Danes, though that intercourse produced cruelty and oppression on the part of the latter towards the former. The naval superiority of the Danes had made them generally successful in all their proceedings against the English, and about this time they enlarged their open barks of twelve oars, into regular vessels of considerable size and strength; many of them were capable of holding 100 men, and some even more.

We are informed that the ships of Canute were beautifully covered over with gold and silver. It appears that they had each but one mast, which was ornamented with a gilt metal vane under the figure of some bird, to let them know which way the wind blew. At the sterns were various figures, plated with gold and silver, such as of a man, a lion, a dragon, a fish, &c. There was, in all probability, a great deal of tinsel and ornament about the royal vessels; but the craft which held the inferior people was of a rougher and ruder sort.

The ancient English chronicles afford but slender information of the progress of naval architecture and of navigation among the Anglo-Saxons; it is probable, indeed, that but little change was made from reign to reign. There appears, however, in the reign of Hardicanute a step towards luxury, which shows that the art of ship-building had been making silent progress. Earl Godwin, having murdered Prince Alfred, son of King Ethelred, to appease the anger of Hardicanute, the half-brother of the prince, presented to him a galley sumptuously gilt, and rowed by eighty men, each of whom wore on his arm a golden bracelet, weighing sixteen ounces. This description certainly implies a galley more splendid than was in use in the Mediterranean at the same period.

Navigators, accustomed to depend on the almost infallible assistance of the compass and quadrant, and of arithmetical and astronomical tables, ready constructed by men of eminence in the various departments of science, will be aston-

shed when they reflect on the intrepid spirit of the Danes and Icelanders of the ninth century, who, assuredly destitute of the compass, for which they substituted the flight of birds, dared to commit their barks, for several days, perhaps often weeks, to a boundless expanse of ocean, and trust their lives to the chance of seeing the sun and the stars. Arngrim Jonas, an Icelandic historian, tells us the way in which the flight of birds was made to act as a guide to the mariner. He says that when Flok, a celebrated Norwegian navigator, was going to set out from Shetland to Iceland, he took on board some crows, because the mariner's compass was not yet in use. When he thought he had made a considerable part of his way, he threw up one of his crows, which, seeing land astern, flew to it; whence Flok, concluding that he was nearer to Shetland than to any other land, kept on his course for some time; and then sent out another crow, which, seeing no land at all, returned to the vessel. At last, having run the greatest part of his way, another crow was sent out by him, which, seeing land ahead, immediately flew for it; and Flok, following his guide, fell in with the east end of the island. Such was the simple mode of keeping their reckoning and steering their course, practised by these bold navigators of the stormy Northern Ocean.

A people now appeared on the stage of history, who were destined to play an important part among the nations of Europe. These were the Normans, who, originally coming from Norway, gradually got a footing on the north-west coast of France, which hence obtained the name of Normandy. From this territory they made predatory excursions to any quarter where they thought advantage was to be gained; and being a hardy, robust, and courageous race, they met with great success.

Shortly before the Normans invaded Britain, they showed themselves to be powerful rivals, in maritime affairs, to the southern nations. This was brought about in a way very similar to the establishment of the Saxon rule in Britain, some centuries before. The Sicilians, being harassed by pirates, called in the assistance of the Normans, who afterwards settled among them, seemingly conforming to the habits of the people, and ultimately gained great ascendancy. They conquered a considerable part of Italy, and then directed their arms against the eastern empire. Thirteen hundred Norman knights, thirteen thousand soldiers, arms, wooden towers covered with hides, horses, &c., were transported across the Adriatic, to the eastern empire, under Robert Guiscard. The attempt was, however, ultimately unsuccessful.

The Norman invasion of England affords evidence of the small dimensions of the vessels in which William the Conqueror brought over his army from Normandy to England. The number of vessels was said to amount to three thousand; and as his army amounted only to sixty thousand, it allowed, on an average, but twenty men to each vessel: as, however, the vessels were only used as transports, to convey the army across the channel, we may thus account for the defectiveness of the vessels, considered in the light of war-ships. The fleet which Harold opposed to the Norman progress, appears to have been of a superior class of vessels; but as William's plan was to carry on the contest by land, Harold's fleet was foiled of any opportunity of producing the desired advantage.

Although the intercourse between England and France increased in these times, owing to the elevation of the Norman princes to sovereign rule in England, and although in consequence the maritime business of this country was promoted thereby, yet we find that the Norman vessels had likewise but one mast, and that the ropes came down from the top of the mast, some to the prow and others to the stern of the vessel. In the course of time these shrouds, or sail-ropes, were brought down to each side of the ship, which method, having been found by experience to be more convenient, is continued to the present time.

There are accounts delivered down to us of the discovery of Ireland, the Orkneys, the Shetland, the Hebrides, and other islands, by the northern navigators; and the Icelandic histories of the present time give narratives of intercourse established in very early ages between Iceland and Ireland. This intercourse was carried on partly with a mercantile view, and partly under the romantic, but in those days widely extended, notion of being at some time enabled to navigate on to the west, and reach the regions of the dead, and the abodes of bliss; which, for ages upon ages, were supposed to lie in that direction of the horizon where the sun drops beneath our view.

The Feroe Islands had been discovered about the latter end of the ninth century, by some Scandinavian pirates; and soon after this Iceland was colonised by Flok, the Norwegian, mentioned before. Iceland, it appears, had been discovered long before the Norwegians settled there; as many relics, in the nature of bells, books in the Irish language, and wooden crosses, were discovered by Flok, in different parts of the island: so that the Irish seem to have first set foot upon that isle. The Icelandic chronicles also relate that, about these times, the Northmen discovered a great country to the west of Ireland, which account has by many been deemed apocryphal; for, if true, they must be held to be some of the early discoverers of America; but it seems pretty clear that they made their way to Greenland in the end of the tenth century. The settlement effected in Greenland, though comprising but a small population, seems to have been very prosperous in these early times in mercantile affairs. They had bishops and priests from Europe; and paid the Pope, as an annual tribute, 2600 pounds weight of walrus-teeth, as tithe and Peter's pence. The voyage from Greenland to Iceland and Norway, and back again, consumed five years; and upon one occasion the government of Norway did not hear of the death of the bishop of Greenland, until six years after it had occurred; so that the art of navigation after all must have been in these times but at a very low pitch. We shall notice this subject more particularly at the conclusion of this paper.

The description left of Greenland by the old navigators agrees with modern observations. It presents the same dreary appearance now as it did then; looking like a vast but irregular accumulation of rocks and glaciers. Enormous icebergs floated along the coast, and filled every inlet. The awful appearance of nature in these parts of the world, its remoteness, and the horrors of the stormy seas which intervened, soon made it, in the popular belief, a land of wonders. The surrounding sea was said to be inhabited by marine giants of both sexes; and the terrific icebergs, as they moved along, were reported to be guided by invisible hands It was also said that a man, named Hollur Geit, walked from Norway to Greenland on the ice, conducted by a goat. The northern horrors, just alluded to, are well portrayed by the Poet of the Seasons:—

> Ill fares the bark with trembling wretches charged,
> That, tossed amid the floating fragments, moors
> Beneath the shelter of an icy isle,
> While night o'erwhelms the sea, and horror looks
> More horrible. Can human force endure
> Th' assembled mischiefs that besiege them round?
> Heart-gnawing hunger, fainting weariness,
> The roar of winds and waves, the crush of ice,
> Now ceasing, now renewed with louder rage,
> And in dire echoes bellowing round the main.

Greenland, of which we have spoken above, seems to have been called Viinland, or Finland, from the vines which were discerned by the early discoverers as abounding in this country; and, in fact, wild vines are found growing in all the northern districts of America. A German, one of the party who first went to these coasts, having observed the vines, and having shown his companions the use of this vegetable produce, they agreed to call the place *Viinland*, or *land of wine*. Some Normans landed there soon after, and saw there many of the natives, of diminutive stature, whom they called dwarfs, in canoes covered with leather. These persons appear to have been the Esquimaux, with whom they carried on a very lucrative trade in furs. This Viinland is, however, supposed by some persons to have been Newfoundland; and if so, America must in reality have been discovered as much as five centuries before Columbus sailed so far as the West Indies: and moreover, it has been supposed that the many traditions about the West, existing in the time of Columbus, first set him to prosecute the idea of discovering another world.

The geographical knowledge of the people of Europe was very small at the time that we are writing of. What there was, was confined to the cloisters; and that was little. The abbot of Clugny, in Burgundy, thought that Paris was so remote, that he refused to comply with the request of the Count de Bourcard, who wished to establish a monastery of his order at St. Maur, in the neighbourhood of Paris. The knowledge of the monks did not oftentimes extend beyond the walls of their own residence; and they had, perhaps, never heard of places distinguished even in their own country. Hence it was that the papal dominion was so easily extended, so firmly rooted for many ages, that all the learning and genuine piety of the martyrs could, in some countries at least, but shake it; though in some

others this evil power may have been overturned. Even such a person as Otho, bishop of Bamberg, in Bavaria, had never heard of the Baltic Sea; and was vastly surprised, at sailing across it, to find that it was so broad, that from the middle of it the opposite shores seemed just like clouds in the horizon.

But, notwithstanding all this, some distinguished persons, whose interest led them to explore in order to extend their power and dominion, endeavoured to obtain a well-arranged knowledge of the world. Charlemagne of France had a large table of silver, on whose surface was engraved a map of the world as then known. His grandson Lothaire, in the war which he carried on with the other Carlovingian princes, used this precious and expensive picture of the earth, not for the guidance and direction of his soldiers, but for their more immediate necessities; so that, as it has been quaintly observed, "the silver world was soon melted down to supply the necessities of one of its kingdoms."

We have thus passed over the first half of the middle ages, which we may assume to have terminated at the era of the Crusades, at which time, in a general point of view, the practice of navigation and the art of ship-building does not seem to have advanced beyond the state in which it was left by the Carthaginians, when their country was finally depopulated by the Romans. So that, in reverting to the countries and people with whom we set out, we may observe that about the year 800 maritime affairs had sunk to so low an ebb, that there was scarcely what could be with propriety called a navy, in the world, except the galleys of Venice, and of some of the northern nations, such as the Saxons, &c. The Constantinopolitan empire, the French empire under the emperor Charlemagne, the Saracens, and other nations, were now so busily occupied in military transactions, that they had neither time nor treasure to augment and maintain their fleets.

It has been observed that had Mahomet been at all attached to naval affairs, he might have made a complete revolution in the mode of constructing and managing ships, from the enormous power which gradually accumulated in his hands. He chose, however, to propagate his creed by fire and sword; and, beginning from a small spot in Arabia as a centre, he extended his dominions by force of arms to the neighbouring countries of Syria, Persia, Asia Minor, Egypt, &c., which could be accomplished by land. Mr. Charnock, in his *History of Marine Architecture*, says—"The collection of an army, more particularly considering the simple state in which military tactics then were, was the operation of a few days, or perhaps only of a few hours. Every peasant could be transformed on the instant into a soldier. He readily became acquainted with all the duties of his profession. The productions and plunder of the districts which he overran with religious zeal, and in the inspired hope of obtaining eternal sensual felicity after death, made him totally regardless of his life, and supplied him with food, as well as with raiment; so that his sword and his Koran became the only necessary articles of equipment for the field of ravage and of glory. A navy was not to be collected by such slender means. Its formation required a species of deliberation, that was incompatible with the views of Mahomet and his followers."

We shall form some idea of the insignificant position which naval pursuits assumed in this age, by considering that in two centuries the creed of Mahomet had spread over nearly half of the then known world, without the necessity of any ships, but mere transports to convey soldiers; for the commerce with other countries was carried on almost entirely by caravans, which travelled by land.

By degrees, however, new nations, or new assemblages of people, sprang into notice, and formed the germs from which powerful nations afterwards arose. Thus, a party of Andalusians, from the south of Spain, joined themselves into one predatory band, and then ravaged the coast of Italy, and began to excite an attention to naval affairs among those who had to defend themselves from these attacks. A new republic also—Genoa—gradually assumed an imposing position; and being so near Venice, which at that time ruled the Mediterranean, began to divide with her the maritime traffic of that important sea. Another band of adventurers showed themselves in Croatia, on the eastern shore of the Adriatic Sea. Their vessels were made without decks, and were also without rostra, or beaks: they were in fact nothing more than boats, (although it is customary to apply the term *galley* to them); for a fleet of one hundred such vessels contained only three thousand men, including both sailors and soldiers.

The information which the Mediterranean nations acquired concerning Northern countries increased, and, one by one, we find new countries appearing on the page of history. Thus about the ninth century, the Roxolani, or Russians, first became known to the Constantinopolitans; and by the tenth century, sufficient was known of them to indicate their mode of navigating the Baltic. Their canoes were formed of a single tree, and in them were brought slaves, furs of every description, the spoil of their bee-hives, and the hides of their cattle, from the north towards southern districts, by means of internal seas, lakes, and rivers. These articles of merchandize were conveyed, once a year, to Constantinople, by a fleet of canoes, which passed down the Borysthenes and other rivers leading from Russia towards the Euxine Sea; and in exchange for their cargoes, carried back corn, wine, oil, and other productions, to their own country. These yearly visits gave the Russians a thirst for the wealth and luxury which they witnessed at Constantinople; and in progress of time, they formed piratical parties for seizing by force that which they had previously fairly gained by barter. These piratical excursions were made in vessels which were thus formed: a canoe was scooped out of the stem of the beech or willow, and the edges were extended upwards by planks fastened side by side, until the length of the boat attained sixty feet and the height twelve feet. These boats were built without a deck, but with two rudders and a mast, so that they moved with sails and oars: each boat would contain seventy men with their arms, and sufficient provision, consisting of water and salt fish. Twelve hundred of these boats were, in some cases, joined in one combined fleet, which descended the Borysthenes and other rivers, and landed their men wherever spoliation could be effected.

At the end of the twelfth century, the ancient semicircular line of battle was still preserved, by arranging the strongest ships in the wings, with a view to enclose the enemy as in a net. The soldiers stationed on the upper deck, or on the raised platform or forecastle, made a close bulwark of their shields; and to give them free room to fight, the rowers sat below. When the hostile fleets approached, the sound of the trumpets and the shouts of the men gave the signal for the engagement, which commenced with a discharge of missiles on both sides. The beaks were forced against the enemies' sides; the oars were entangled; the vessels were grappled together; and the engineers endeavoured to burn the enemies' ships with the Greek fire, which was now used by Turks, Saracens, and Christians. Such was, very nearly, the mode of fighting used by the ancient Greeks and Romans, as described in our first paper*.

We shall continue the subject in our next paper, by turning our attention to the Crusades; which so greatly affected the state and condition of Europe, and which will open to us new scenes in nautical affairs, and new nations distinguished therein.

* See *Saturday Magazine*, Vol. XII., p. 38.

FROM AN OLD MOSAIC.

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FISHERMEN OF FRANCE.

FRENCH FISHING PORT.

In traversing the French coast from north to south, from Dunkirk to the Alps, we find it inhabited successively by Flemings, Normans, Bretons, Basques, or Biscayans, and the men of Languedoc and Provence. Much as these differ in point of origin and language, they remarkably resemble each other in their habits and daily occupations. The whole of the French coast provides seamen for the royal navy, and masters and pilots for merchant vessels, as well as dockyard men for the arsenals; and while the male population is engaged in one or other of these employments, or in the coasting-trade and fisheries, the women, old men and children, remain at home, attending to the culture of the ground and harvest-work. When the return of Winter brings them all together, the old boats are repaired, new ones built, and nets are manufactured.

It has been remarked, however, that although the whole line of the French coast supplies seamen, all do not possess the same qualities. The men of Provence and Gascony are the most active and the most intelligent; the Bretons the steadiest, the hardiest, and the stoutest. A French admiral, Grivel, considers the inhabitants of ancient Armorica, now Brittany, to be peculiarly fitted for the sea.

The seaman, when ashore, carries into his family habits and manners quite his own. The house he occupies is generally cleaner than those belonging to landsmen of the same rank in life who only till the soil. He wears also on his countenance an expression of seriousness approaching to melancholy, indicating a life exposed to risks and difficulties.

The inhabitants of the French coast, from the simple fact of their geographical position, as soon as they cease being employed in the navy or merchant service, engage in one or other of the fisheries. But such as are fishermen by profession are divided into two classes, of which the one are attached to the whale and cod fisheries, the other consists of those who fish along the coast and supply the towns that border upon it. The former embark from the ports of French Flanders, Normandy, and most of all, of Brittany; they are engaged during the earlier months of the year, and return in September or October. Such as do return, (for many perish,) generally have four or five hundred francs (from 16*l.* to 20*l.*) in their pockets, to assist them through the Winter. This they may increase by fishing off the coast, or by making nets for those who send out the fishing-vessels, working up the raw material with which the latter supply them, and are paid two or three hundred francs for their labour. From these different resources, a family of four or five persons is supported; and though with industry and good management a certain measure of comfort may be thus secured, there can be no laying up of any positive provision against future wants. Such is the condition of the French seaman, whether he serve his country at twenty-seven francs per month, or engage in the merchant service at forty-five francs.

Those who fish along the coast, though exposed, perhaps, to fewer risks than those who go to the whale-fishery off Cape Horn, or to the northern cod-fishery, are worse off in other respects. Landernau, Belle-isle, and some other ports on the coast of Brittany, are the chief stations for the sardine fishery; Cancale, Grandville, and Dieppe, are the same for oyster dredging, and the Channel ports in general for the herring and mackerel fishings. The first of these gives employment to about fifteen hundred boats, each manned with a crew of four,—the master, an experienced seaman, a novice, and a boy. They are engaged, for the most part, about the middle of November, for the following Spring, by merchants who

give them from fifteen to twenty francs for the whole fishing season; but over and above this, the master of each of the boats is entitled to a ninth-part of the fish that are caught, the mate is allowed a tenth, the novice a twentieth, while the boy has nothing at all. They have also a few furnishings, a little wine, wood for fuel to cook their victuals with, &c.; but, on the whole, these poor creatures have hardly enough to meet the first wants of nature, and on some parts of the coast their distress is extreme. Nothing can form a greater contrast with their condition than that of the fishing population of Holland, where, through the universal diffusion of an excellent Protestant education, from the independence and economy of all classes, and the wise combination of the interests of all in common enterprizes, family comfort and a sufficiency of food are found at all times, and universally, prevalent.

The men engaged in the oyster-fishery are not thus exposed to the hazard of actual want. These have the article they bring to market always within certain reach,—the oysters being attached to the fishing ground, from which they are detached by means of an instrument six feet long, somewhat like a shovel, with a kind of sack behind, made of cord or strips of leather. This, when dragged along the bottom of the sea, collects all that comes in its way. The oyster is found along the whole north coast of France, but is nowhere so plentiful as at Cancale and Grandville. Upwards of a hundred millions are taken up every year, and yet they seem more inexhaustible than ever. The oyster-fishery produces about fifteen millions of francs (about 600,000*l.*) a-year, and hence diffuses the means of easy subsistence at the two ports we have mentioned, whose population has lately advanced from 3500 to 5000 inhabitants. The oyster-dredgers are, generally speaking, better lodged, clothed, and fed, than any other class of seamen. The fishings are carried on with most activity during Winter; and in spite of the severity of the weather, it is not unusual for the men to spend several successive nights at sea.

Next to the Grandville and Cancale fishermen, those of the inhabitants of the coast of France, who seem to live most comfortably, belong to the Flemish and Channel ports; for their superiority in this respect, however, they are indebted not so much to their nets as to other petty branches of industry which they combine with fishing. The Flemings cultivate each a small spot of ground, or engage in the egg trade with England. The fishermen of Cherbourg, Fecamp, and St. Valery, rear pigs for selling to vessels going to sea, or engage in smuggling tobacco and snuff.

Unhappily there is one vice common to all the seafaring people along the French coast, from Dunkirk to Bayonne, and that is the abuse of spirituous liquors. In Flanders the men make themselves drunk with gin; in Normandy with cyder; in Brittany with brandy; in the Landes and in Gascony with wine. Drunkenness and ignorance are the two great evils that press down the labouring part of the population of the French coast. Even when drunkenness fails to brutalize them, ignorance makes them the victims of credulity and superstition. The hair-breadth and apparently-miraculous escapes of a seaman's life, together with the sublime aspect of the ocean continually present to him, might promote true religion in an enlightened person, but only render the ignorant man childishly superstitious, and engage him in practices not in the slightest degree calculated to improve his moral character. Hence those barbarous manners which from time immemorial have distinguished the shores of the ocean. The inhabitants have become habituated to the idea that a wrecked vessel is their lawful prey and a godsend. Nay, it is not many years since the inhabitants of Brittany, during storms, would allure ships to the coast by false signals, then plunder the cargoes, and sometimes murder the crews.

JUDICIAL COMBATS AND TRIALS BY ORDEAL.

The custom of judicial combats, of which traces were discoverable in our laws until the beginning of the reign of George the Fourth, was introduced into civilized Europe by the barbarous tribes of Germany who overwhelmed the Roman empire. It appears to have been first legally established by Gondebald, king of the Franks, by an edict published at Lyons, March 29, A.D. 501, in which the monarch assigns his reasons for establishing, or rather sanctioning the institution: "Let causes be decided by wager of battle, to the end that rash oaths should no longer be taken respecting obscure facts, nor false oaths respecting certainties." What a singular picture of morals is contained in these few words; perjury had become so monstrous an evil, that murder was chosen as the milder alternative!

The judicial combat thus sanctioned by royal authority, was called the "judgment of God!" The Germanic tribes worshipped a deity who delighted in war and slaughter, and so deeply was this ancient creed impressed upon their minds, that it long resisted the influence of Christianity; the Romish clergy sanctioned the profanation of attributing to the Divine Being the character of the heathen deity, because it tended to increase their power by giving them a pretext for interfering in judicial trials. The forms of the legal combat were composed of the customs of savage life, combined with the corruptions of Christianity; religion and law were equally desecrated by being brought to preside in a field of blood. The rules of judicial combat are detailed at great length in the ordinances of various kings during the Middle Ages, but the following summary will be found amply sufficient for general readers.

When a plaintiff claimed a possession which the defendent refused to resign, or charged him with a crime which he denied, a challenge was the immediate result. Whichever of them appealed to the combat threw down before his adversary some pledge, usually a glove, which was called the gage of battle, and taking this up was the signal that the challenge was accepted. In later ages it was necessary to have the permission of the king or liege lord before a challenge could be given, but at first, the Suzerain had no right to interfere until called to preside at the combat or to name a president, and his power was limited to naming the place and time for the contest. When the challenge was accepted, each combatant named certain witnesses, called sponsors, or godfathers, "because," says an old historian, "they were about to attend a baptism of blood," and these called the champions their god-children! These sponsors, or seconds as they were subsequently called, were originally appointed to watch the combat, and see that its rules were fairly observed; but they soon began to join in the fight themselves, either to aid or to avenge their principals.

Application was next made to the Suzerain to appoint the umpire or president, and the time and place of the combat. A space called the "close-field" was marked out, and surrounded by ropes or palings. At the upper part of this little amphitheatre

a gallows or a pile of wood was erected, that the vanquished, if he escaped with life, might be instantly hanged or burned. In front of this were two seats covered with black, for the two combatants. Before entering the lists the combatants attended mass, and received the eucharist in the form prescribed for its administration to persons at the point of death; and so common were such events, that a special service was prepared for the occasion, called "the duellist mass," (*missa pro duello,*) which may be found in most ancient missals. When the service was concluded, the combatants were led by their god-fathers, accompanied by the heralds and clergy, to their seats in the lists, and a discourse was pronounced, usually by a priest, exhorting them not to tempt Providence if conscious of falsehood or injustice.

An oath was administered to each, in which they called to witness, God, the Virgin Mary, the Saints, and especially "that good knight and gentleman St. George," that their causes were just, and that they would not depart from them.

They next swore on the Gospels that they had used no sorcery, witchcraft, or magical incantations, and that they had not about them any spell, amulet, or charm. But not satisfied with the oath, the president, called usually "the marshal of the field," caused the combatants to be searched, and at the same time had their arms measured, so that neither should have an unfair advantage by length of weapon.

The marshal of the field, attended by the sponsors, then divided as fairly as he could the advantages of ground, sun, and wind, sometimes adding comfitures and other little sweets to serve as refreshments in the battle. The lists were then cleared, and the spectators prohibited from entering them under pain of death; severe penalties were also denounced against any person who should distract or interrupt the combatants by coughing, sneezing, speaking, or making any sound whatever. When these preliminaries were arranged, the marshal gave the signal for combat by dropping his truncheon, and saying to the sponsors, "Let the brave champions go."

In the earlier ages every combat was a duel "to the utterance," that is, until one or other of the champions was so disabled as to be unfit for continuing the fight. Defeat was condemnation, and when the subject of charge was a capital crime, the vanquished passed at once from the lists to the gibbet.

Judicial combats in France were carried to a greater extent than in any other European country. Not only could a challenge be maintained between the principals of a suit, but either of the parties might challenge one of his adversary's witnesses, or even the judge by whom the cause was tried, if dissatisfied with his decision. Ladies or ecclesiastics fought by proxy; if their champion was overthrown he was condemned to lose his right hand, and this penalty was rigidly enforced, in order that champions should fight as strenuously in the cause of others as they would in their own.

Wager of battle was a privilege peculiar to the nobles; those of lower rank were generally compelled to have recourse to ordeal. The most common form of ordeal was the trial by burning. The plaintiff or defendant claiming this form of process, appeared before an ecclesiastical judge and lifted up a bar of red-hot iron in his right hand. The hand was then bandaged and secured by a seal. At the end of three days the seal was broken and the bandage removed; if no marks of burning appeared the patient gained his cause, if otherwise, sentence was pronounced against him. This form was sometimes varied; the party was required to walk barefoot over a certain number of burning ploughshares, or to carry a burning horse-shoe to a given distance; if he did so without manifest injury he was declared to have gained his cause.

The trial by boiling water was conducted with great ceremony; a ring was consecrated and thrown into a cauldron of boiling water, and the party had to plunge his naked arm into the vessel and take out the ring without wincing. It was believed that there was more room for artifice in this ordeal than in any other; and it was therefore required that the water should be heated in the presence of competent witnesses, and that it should boil up before the holy ring was thrown into it.

The trial by cold water was the most dangerous to the patient. A priest blessed the water in some deep pond or reservoir, into which the party was thrown bound neck and heels. If he floated, it was considered that the consecrated element refused to receive the wretch, and if he sank, he ran a fair chance of being drowned. This was the favourite ordeal in the trial of witches; when any of these unfortunate beings floated, they were hurried to the stake or stoned by the brutal spectators.

The judgment of the cross was a form of ordeal patronized by an emperor so enlightened as Charlemagne. He ordained that in certain disputes, especially between children, the parties should hold their hands extended so as to represent a cross, and whoever first let their hands fall, was adjudged to have lost his cause.

Many examples of judicial combats are recorded in the old chronicles; we shall extract the description of one which took place in the presence of Louis the Second, king of France, surnamed the Stammerer, about A.D. 878, preserving as well as translation will permit, the style of the original historian.

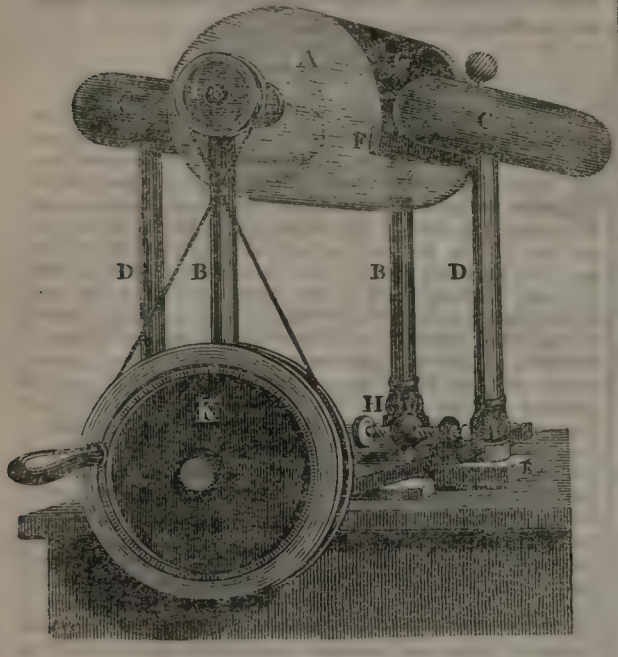
Ingelgerius, Count of Gastinois, was found one morning dead in his bed; one of his relations, named Goutran, accused his widow of the murder, and of other criminalities besides. Nobody appearing as champion for the lady, she summoned to her aid, Ingelgerius, Count of Anjou, whom she had held in her arms at the baptismal font, giving him the name of her husband, although he was not yet more than sixteen years of age. The count readily engaged to support his godmother's quarrel, and a day was fixed for the combat. On the appointed morning the young count heard mass, distributed alms to the poor, made an offering to the church, and fortified himself with the victorious sign of the cross; after which he proceeded to the lists, where Goutran stood prepared for the encounter. The lady of Gastinois was then summoned, and the usual oaths taken; the signal was given, and the champions met. Goutran struck the count so rudely that he cleft his shield in twain, but neither shield nor harness availed against the count's lance; he pierced Goutran through the body and threw him from his horse. The count then dismounted and cut off the head of the accuser, which he presented to the king, who received it as gladly as if it had been a city. The countess was immediately set at liberty, she bent her knee to the king, and then in the presence of the whole court threw her arms round her champion's neck and kissed him.

In the reign of William the Conqueror judicial combats appear to have been very common in England, for one of his laws forbids clergymen to fight duels without the previous permission of their bishop. But the feelings of the British people were averse to this barbarism, and, from the eleventh century, courts of law possessed more authority in England than in any other country.

THE study of truth is perpetually joined with the love of virtue; for there is no virtue which derives not its original from truth; as, on the contrary, there is no vice which has not its beginning from a lie. Truth is the foundation of all knowledge, and the cement of all societies.—CASAUBON.

ELECTRICITY.
No. III.
ELECTRICAL MACHINES.

BEFORE we enter upon a particular explanation of the varied phenomena which present themselves whilst pursuing a series of electrical investigations, it seems desirable that we give some account of *Electrical Machines*, on whose agency, under proper management, we depend for the successful prosecution of these interesting researches.



The adaptation of the several parts of an electrical machine, by means of which we obtain at pleasure large supplies of electricity, is a consequence of the knowledge we have previously attained of the habits of certain substances, when submitted to the process of electrical excitation. The instrument consists of non-electrics and electrics, or, as they are with equal propriety termed, conductors and non-conductors; so arranged that one part may be easily excited, and electricity made to accumulate on it, another part enabling us to give to the electricity so obtained any required direction, whilst a third effectually prevents its escape to the earth, until the precise moment we may have determined on.

Electrical machines are made of different forms. For ordinary purposes those of the most simple construction are the most generally useful; of which there are two kinds—the *cylindrical*, and the *plate*, machine. The former of these we shall first describe. It is made of various sizes; but we shall give the dimensions of the principal parts of one, which, by many years' practice, we know to be most convenient for experimental illustration.

Let A in the preceding figure represent a cylinder of glass, say about twelve inches in diameter, and twenty or twenty-four inches long. It must be made as nearly as possible of an equal thickness throughout its whole length, and the nearer it approaches to a perfect cylinder the better. The ends must be somewhat thicker than the sides, with which they should form an angle of about 10°.—B B are glass pillars firmly secured to a thick piece of mahogany, or some other hard wood, which should be about three feet long by two feet nine inches broad. The cylinder is mounted on these pillars, between which it revolves on an axis at each end; motion being communicated to it by means of a winch attached to one of its axes (I), or more conveniently by the multiplying wheel, K. C C are hollow cylinders of metal, about eighteen inches long, and four inches in diameter. These are called *conductors*, and are fixed upon glass pillars D D, similar to those which support the glass cylinder, as already described. The pillars D D are not attached permanently to the frame-work of the machine, but are cemented into pieces of wood, one of which is shown at E, moving in a groove, and by means of adjusting screws (H) their positions are regulated as circumstances require. To one of the conductors is attached a cushion or rubber, F, about two inches wide, and nearly equal in length to the glass cylinder, against which it is made gently and uniformly to press, by a slender metallic spring at its back, aided by the adjusting screw H. The cushion is made of soft leather (either red or purple basil are the kinds commonly used), and is stuffed with horse-hair or wool. The former, on account of its greater elasticity, is the most preferable. The other conductor is furnished with a row of fine steel points, projecting about an inch from its side, and so arranged that they may be as close as possible, but without touching it, to the glass cylinder. To the upper side of the cushion F, is sewn a piece of stout green or black silk, slightly stiffened by being oiled. This flap of silk, G, extends from the rubber, across the surface of the cylinder, to within about three-fourths of an inch of the steel points just mentioned.

The conductor to which the steel points are attached is commonly called the *prime conductor*. As shown in the figure, it stands parallel to the cylinder; but in practice it is more convenient to place it at right-angles; in which case the points are fixed to the end nearest the machine, to receive the electricity which is given off at the opposite end.

The several parts of the electrical machine being thus arranged, we have no difficulty in understanding its principle, and the conditions on which its efficacy depends. Before, however, it can be pronounced ready for action, it must be ascertained that it is perfectly clean and dry. The glass pillars, which support the cylinder and conductors, must be carefully wiped with an old silk-handkerchief. Dust and other impurities should be removed from every other part of the instrument; and the cushion and silk flap being first cleaned, the former must have a little fresh *amalgam* spread on it.

As the energy of an electrical machine is increased or diminished by the qualities of the amalgam applied to it, we shall here give instructions for making that useful compound.

Take equal parts, by weight, of tin and zinc, melt them together in a crucible, or common iron ladle, and pour them upon three parts, by weight, of mercury, in a wooden box, which must be shaken until the metals are cold. When required for use, the amalgam must be pulverized, in a mortar, to a very fine powder, mixed with a small quantity of tallow or hog's lard, (we prefer tallow), and thinly spread on the cushion by means of a blunt knife.

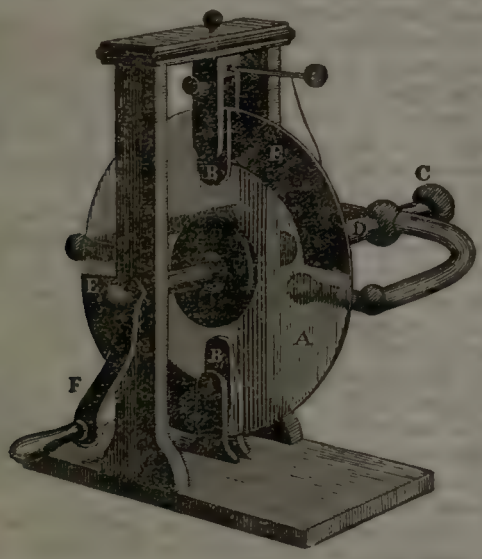
Now let us return to the machine, which we suppose to be properly cleaned and amalgamated; but which will disappoint our expectations, when we begin to operate with it, if the atmosphere of the room where it is placed be not warm and comparatively dry. Many persons are in the habit of placing an electrical machine opposite a fire previous to using it,—a plan we have never adopted, and which we consider as injudicious as it is unnecessary. With the utmost care it sometimes happens that by unequally heating the machine, either the cylinder or glass pillars are

fractured; whilst there is always the risk of softening the cement, and thus deranging some of the most important parts of the instrument.

In cold weather there should be a fire in the room in which we propose to perform electrical experiments, and the whole of the apparatus should be placed in the room, so that it may be all of the same temperature as the surrounding atmosphere. The doors, and especially the windows, of the room, should also be kept closed. At other seasons of the year, unless the external atmosphere is more than ordinarily damp, a fire in the room is not required; but the windows must not be opened.

It is by some persons recommended that the glass pillars and ends of the cylinder of the electrical machine should be coated with a resinous composition, resembling sealing-wax. This we consider a defect, rather than an improvement. If the different parts of the instrument are properly proportioned, and judiciously combined, there is no difficulty in rendering it effective; and the less encumbered the glass, or other parts, are with cement or varnish, the more easily can they be kept clean, and the more promptly may the machine be got into action.

In its essential arrangements, the *plate* machine resembles that we have been describing; and with this advantage, that it is more simple in its construction, more easily excited, and can be cleaned and kept in action with less labour. It is here represented



A is a circular glass plate, say twenty-four inches in diameter, and about one-fourth of an inch thick; made as true as possible, and mounted on an axis passing through its centre, which is supported at each end by a strong frame-work of mahogany, securely fixed to a broad base of the same material. Motion is given to the plate by turning the winch, F. B B are cushions or rubbers, made in the same manner as that for the cylindrical machine, but of a different shape; and there are four of them connected in pairs to the top and bottom of the frame of the instrument, so as to press equally on both sides of the plate. This is effected by means of a spring-frame, centre-pins, and adjusting-screws. E E are silk flaps attached to the rubbers, and united at their edges, so as to keep them in their places at the sides of the plate. C is the prime conductor, made of brass, about an inch in diameter, and somewhat of an elliptical form. It extends entirely across the plate, forming a curve at a considerable distance from it, and receives the electricity by pieces returned at each end, which are furnished with steel points. That part of the conductor most distant from the plate terminates in a large hollow sphere of brass, which has one or more holes in it for connecting the machine with various kinds of apparatus. The conductor is insulated, and sustained in its place by a large rod of glass, D.

The plate machine, as here described, is not so well adapted for illustrating the principles of the science of electricity as that of the cylindrical form. By a very trifling alteration, or rather addition, it may, however, be rendered equally useful. But this difference in the construction of the instruments will be better understood, when we have said something about the methods of using them.

It is a poor philosophy and a narrow religion, which does not recognise God as all in all. Every moment of our lives, we breathe, stand, or move in the temple of the Most High; for the whole universe is that temple. Wherever we go, the testimony to His power, the impress of His hand, are there. Ask of the bright worlds around us, as they roll in the everlasting harmony of their circles; and they shall tell you of Him, whose power launched them on their courses. Ask of the mountains, that lift their heads among and above the clouds; and the bleak summit of one shall seem to call aloud to the snow-clad top of another, in proclaiming their testimony to the Agency, which has laid their deep foundations. Ask of ocean's waters; and the roar of their boundless waves shall chant from shore to shore a hymn of ascription to that Being, who hath said, 'Hitherto shall ye come and no further.' Ask of the rivers; and, as they roll onward to the sea, do they not bear along their ceaseless tribute to the ever-working Energy, which struck open their fountains and poured them down through the valleys? Ask of every region of the earth, from the burning equator to the icy pole, from the rock-bound coast to the plain covered with its luxuriant vegetation; and you will not find on them all the record of the Creator's presence? Ask of the countless tribes of plants and animals: and shall they not testify to the action of the great Source of Life? Yes, from every portion, from every department of nature, comes the same voice: everywhere we hear Thy name, O God; everywhere we see Thy love. Creation, in all its length and breadth, in all its depth and height, is the manifestation of thy Spirit, and without Thee the world were dark and dead. The universe is to us as the burning bush which the Hebrew leader saw: God is ever present in it, for it burns with His glory, and the ground on which we stand is always holy.

How then can we speak of that Presence as peculiarly in the sanctuary, which is abroad through all space and time?—Francis.

Take heed that thou seek not riches basely, nor attain them by evil means; destroy no man for his wealth, nor take anything from the poor: for the cry and complaint thereof will pierce the heavens. And it is most detestable before God, and most dishonourable before worthy men to wrest anything from the needy and labouring soul. God will never prosper thee in aught, if thou offend therein: but use thy poor neighbours and tenants well, pine not them and their children to add superfluity and needless expenses to thyself. He that hath pity on another man's sorrow, shall be free from it himself; and he that delighteth in, and scorneth the misery of another, shall one time or other fall into it himself. Remember this precept, "He that hath mercy on the poor lendeth unto the Lord, and the Lord will recompense him what he hath given." I do not understand those for poor, which are vagabonds and beggars, but those that labour to live, such as are old and cannot travel, such poor widows and fatherless children as are ordered to be relieved, and the poor tenants that travail to pay their rents, and are driven to poverty by mischance, and not by riot or careless expenses: on such have thou compassion, and God will bless thee for it. Make not the hungry soul sorrowful, defer not thy gift to the needy, for if he curse thee in the bitterness of his soul, his prayer shall be heard of Him that made him.—Sir Walter Raleigh.

ON WRITING MATERIALS.

No. VII. ON INK.

WHEN a material, such as paper or parchment, had been discovered, which by moderate care might be preserved through a course of ages, it evidently became an important object to employ an equally permanent and durable substance, wherewith to describe those characters which should reveal to future generations, the thoughts and proceedings of the men of other days. It were evidently of little use to have attained the one without securing the other also. If the paper be permanent, so also must be the ink; which latter condition, as far as manuscripts are concerned, has ever been of difficult attainment; nor are we sure that our best writing inks of the present day, are calculated to resist successfully the action of time.

The ink of the ancients seems to have been of a viscid, or oily, nature. Unlike the modern writing ink, it consisted of nothing more than colouring matter and gum. The chief ingredient was a species of soot, or ivory-black, mixed with one-fourth of gum. This mixture was formed into cakes or rolls, with the addition of a little water, and dried in the sun. A similar mode is practised at the present day by the Chinese, in their celebrated Indian Ink, which consists of nothing more than minutely divided carbon mixed with gum-water, and cast in a mould. This was the ink of the age of Dioscorides and Pliny, and continued in use until the seventh century. It was, probably, prepared for writing in a manner similar to the preparation of our water-colours for painting; but it was made more viscid, for the letters in ancient MSS. frequently appear in relief. Dr. Bancroft thus speaks of the writing-ink of Pliny, who lived in the first century of the Christian era.

Any person who will take the trouble of mixing pure lamp-black with water, thickened a little by gum, may obtain an ink of no despicable quality in other respects, and with the advantage of being much less liable to decay by age than the ink now in common use.

We must remark, however, that every black pigment mixed with gum or size, can be readily washed off the paper with water; and Pliny seems to have been aware of the fact, that unless inks sink into the surface of the papyrus, parchment, &c., they can be removed by washing. To obviate this defect, it was common in his age to use vinegar instead of water, for tempering the mixture of lamp-black and gum. An unstable sort of ink was used by Moses among the Jews, in certain ceremonials described in the law; and, in fact, eastern inks, at the present day, may be easily obliterated with a wet sponge. Mention is also made of *Golden Ink* in use among various nations, and among others by the Anglo-Saxons. Silver Ink was also not uncommon. Red Ink was made of vermilion or cinnabar. Purple Ink is very often found in MSS., but none are written entirely with ink of that colour. Capital letters were often written with an ink composed of vermilion and gum. Green Ink was rarely used in charters, but often in Latin MSS., especially those of the later ages. The guardians of the Greek emperors employed Green Ink for writing the signatures of the princes until the latter came of age. Blue and Yellow Inks are sometimes found in MSS. Yellow Ink has probably not been in use for 600 years. In some MSS. metallic and other characters are varnished. Wax was used as a varnish by the Latins and Greeks, but more by the latter. This covering, or varnish, is common in MSS. of the ninth century.

The word *Sepia*, or the *cuttle-fish*, is used by some Latin authors for ink, because this fish, when afraid of being caught, discharged a black matter, in order to conceal itself, which the Romans sometimes used for ink.

Of the various specimens of Black Ink which we meet with in MSS., that used by the Anglo-Saxons, in the eighth and two following centuries, preserves its original blackness much better than that of succeeding ages, not even excepting the sixteenth and seventeenth centuries, in which it was frequently very bad. Pale and decayed ink rarely occurs at any time previous to the last four centuries.

Du Cange says, that the emperors of the East wrote with Red Ink, preserved in a golden ink-horn set with gems. He also mentions a black or dark-coloured ink, made of silver and lead, by which the cavities in sculpture were marked.

Black Books, or Books of Necromancy, were coloured with a peculiar blackness, and the letters were believed to be the effigies of animals.

We come now to speak of modern Inks, which may be considered under the following heads: 1st. Indian Ink; 2nd. Printers' Ink; 3rd. Writing Inks; 4th. Sympathetic Inks, including Marking Ink. In the first three varieties only black, red, and blue are known of in common use, but some printers employ ink of various colours.

1st. Indian Ink, or more properly China Ink, is used in China for writing with a brush, and for painting upon the soft flexible paper of Chinese manufacture, which we have already described. The manufacture of China Ink was long kept secret, but there is now no doubt of its composition. Lamp-black and size, or animal glue, or gum, are the necessary ingredients, although perfumes and other substances, not essential to its quality as an ink, are sometimes added. The fine soot from the flame of a lamp or candle, collected upon a cold plate held over the flame, and mixed with pure size made from clean parchment, will afford an ink equal to any that is imported.

2nd. The making of Printers' Ink is a distinct branch of trade in itself. The Printers' Ink-maker is not a printer, nor does he make any one of the varieties of Writing Ink.

Printers' Ink may be called a black paint. It is smooth and uniform in its composition, of a firm black colour, and is remarkable for the singular facility with which it adheres to paper that is thoroughly moistened. Hence it is that the printer always wets his sheets before printing; and the reader will have no difficulty in calling to mind instances of wet newspapers, damp books, pamphlets, &c., dampness being always associated with the freshest wares of the publisher.

Printers' Ink consists essentially of oil and carbon, in a state of minute division. The tenacity of the oil is greatly increased, and its greasiness diminished, by means of fire. Ten or twelve gallons of oil are boiled in a twenty-four gallon iron pot and set fire to. The vessel must be of this size to prevent its contents from running over, since they swell up considerably in boiling. It is suffered to burn for half an hour or more, and the flame being then extinguished by covering the vessel closely, the boiling is continued with a gentle heat until the oil has attained the necessary degree of consistency; in this state it is called *varnish*. It is found necessary to have two kinds of this varnish, a thinner and a thicker, depending upon the shorter or longer boiling, to be mixed as occasion may require, since that which answers well in hot weather becomes too thick in cold; and, besides this, large characters do not require so stiff an ink as small ones.

The thickest varnish, when cold, may be drawn into threads like weak glue, and by this the workman judges of the due boiling, small quantities being from time to time taken out of the boiling pot, and dropped upon a cold tile. The oil loses from one-tenth to one-eighth of its weight by being boiled into the thick varnish.

Lamp-black is the common material to be added to the varnish for a black ink, in the proportion of two ounces and a half to sixteen ounces of the varnish. Vermilion is employed instead of lamp-black for Red Ink. The varnish and the colour are ground together on a stone with a muller, in the same manner as oil-paints are prepared. It is said that new oil cannot be prepared into varnish without the addition of turpentine. Some makers also add black resin and hard soap to the varnish when it has done boiling. We have also heard of treacle being employed to relax the ink a little.

The ink used by copper-plate and lithographic printers differs somewhat from common printing-ink, in being less adhesive; and, in preparing it, the oil is not boiled so long. A little indigo and rose-pink are sometimes added to these inks.

3rd. As an example of the formation of common writing-ink, the reader may dissolve a crystal of sulphate of iron (green vitriol) in a little water, and bruise a nut-gall; then pour a little boiling water on it; this will give him an infusion of galls, a little of which may be added to clear water. If this be mixed with the solution of sulphate of iron, an intensely black compound will result, which is considered by some chemists to be a compound of gallic acid and oxide of iron, or gallate of iron. This substance not being very soluble in water, will subside to the bottom of the vessel containing it, but this subsidence is prevented in practice by the addition of gum-water.

Good Writing Ink may be formed by observing the following directions, which the writer of this article has employed for some years. Take eight ounces of Aleppo galls, in coarse powder, four ounces of logwood, in thin chips, and boil them together in twelve pounds of rain or distilled water for one hour, or one hour and a half; strain the decoction through a hair-sieve; then add four ounces of sulphate of iron, three ounces of powdered gum-arabic, one ounce of sulphate of copper, and one ounce of sugar-candy; stir the mixture until the gum is dissolved, then leave it to rest for twenty-four hours; pour off the clear portion into a stoneware bottle; add about six drops of kreosote, which will effectually prevent the ink from getting mouldy, and then let the bottle be well corked.

In these directions the sulphate of copper may be omitted; the only objection against using it is, that, in mending a moist pen, the ink coming in contact with the penknife coats it with copper whenever such contact is made; but the use of the sulphate of copper contributes to the durability of the ink, and tends to prevent mouldiness.

Some makers recommend that the sulphate of iron should be calcined to whiteness, that acetate of copper be employed instead of the sulphate of that oxide, and that vinegar be employed instead of water; but we have found no advantage from these variations, but, on the contrary, some disadvantage; for the acid of the vinegar tends to soften the pen if a quill be used, and to corrode it if it be a steel pen; so that we cannot recommend vinegar as a menstruum for the colouring materials.

The colour of Writing Ink is effectually destroyed by chlorine; but this powerful agent does not act upon Printers' Ink, on account of the large quantity of carbon contained in the latter. Many complaints are brought against writing ink, which ought to be applied to the writing-paper on which it is used. Such paper made from inferior rags, bleached by an excess of chlorine, discolours the best ink. The obvious test of good ink is, therefore, to write with it on writing-paper of various kinds, and observe the permanency and blackness of the letters after a considerable lapse of time.

Red Ink may be obtained by boiling a quarter of a pound of the best logwood with an ounce of alum and an ounce of cream of tartar, in about a quart or three pints of water; strain it and add immediately sugar and gum-arabic, of each one ounce. Another recipe is to steep one pound of Brazil wood, and one ounce of cochineal, in two gallons of vinegar for twelve hours, then to add four ounces of alum and one ounce of lump-sugar; let it simmer for one hour, then strain and preserve it for use.

It must be remarked that in the preparation of red ink metal vessels must not be employed, as they will be corroded by the action of the acids.

Blue Ink, employed for the faint lines in copy-books, ledgers, &c., is obtained from a solution of indigo in sulphuric acid; the corrosive nature of the acid is removed by the addition of alum, and the ink made fluid and permanent by gum-water.

4th. Sympathetic Inks have been employed occasionally in secret correspondence. The paper is written upon with one of these inks; and the writing remains invisible when dry, and can only be read by adopting for each ink a peculiar contrivance, which we will notice as we proceed.

Many amusing experiments may be tried by the young chemist on this subject; and as the inks are easily made, and their efficacy easily tested, the following directions will suffice.

1. Write with a weak infusion of galls: the writing will be invisible; but if the paper be moistened with a weak solution of sulphate of iron, the writing will appear black. 2. If paper be soaked in an infusion of galls, and dried, a pen dipped in a solution of sulphate of iron will trace black characters on that paper, but colourless ones on any other paper. 3. A dilute solution of nitrate of silver remains colourless in the dark, or by candle-light. If exposed to the sunshine for a minute or two it becomes black. 4. Write with a solution of sulphate of copper; it will become visible by dipping it in ammonia or strong hartshorn. 5. Solution of prussiate of potash affords blue letters when moistened with sulphate of iron. 6. The solution of cobalt in nitromuriatic acid, when diluted, affords an ink which becomes green when heated, and remains invisible when cold. This ink has been used in painting hand-screens, &c. The scene represents a wintry landscape, the ground and houses covered with snow, the trees destitute of foliage. On holding this to the fire, the snow appears to melt, the green grass to appear, the leaves to cover the trees, and summer to have resumed her dominion. On removing the landscape from the warmth of the fire, winter again appears to return. 7. A solution of equal parts of sulphate of copper and muriate of ammonia gives a yellow colour when heated, which disappears when cold.

There are many more sympathetic inks; but these specimens will suffice to show their nature and the methods of preparing them.

Marking Ink, or as it is sometimes called, *Indelible Ink*, for writing on linen, may be prepared by dissolving two drachms of nitrate of silver, and one drachm of gum-arabic, in seven drachms of distilled water, coloured by a little China ink. The cloth to be

written on must first be moistened with a solution prepared by dissolving two ounces of carbonate of soda, and two drachms of gum-arabic, in four ounces of water. The cloth wetted with this solution must be dried before the letters are written. The cloth is then exposed to the light, which, with the assistance of the carbonate of soda, decomposes the salt of silver, and a black oxide of silver remains firmly united to the cloth.

Although this ink has been termed *indelible*, it can easily be removed by washing it in strong ammonia.

When ink falls upon linen, there is, after washing, a yellow-brown spot left, which is called *iron-mould*. To remove this, an expensive article, called by the absurd name of *Essential Salt of Lemons*, is sold. This salt consists of oxalic acid and potash, or oxalate of potash. The iron of the ink forms the stain upon the linen; and with this iron the oxalic acid and the potash combine, forming an oxalate of iron and potash, which is washed out by the action of water. The box of salt of lemons, which is often sold for two or three shillings, is not really worth more than as many pence, and need never be purchased under its expensive name.

CHAIN LINKS OF VARIOUS FORMS.

Among the numerous useful applications of that valuable metal, iron, its substitution for hempen ropes, when formed into chains, is one of great import. The manufacture of iron, and other metals, into chains is of great antiquity. At first, perhaps, chains were merely an ornamental arrangement of copper, gold, or silver wire, for the decoration of persons of distinction. Iron chains were, however, used by the Romans for other purposes. They formed part of the *materiel* of the army, and were employed to bind or degrade captives made during their warlike enterprises. In what manner chains were formed in those early days, whether by welding, or by merely bending the wire, is uncertain.

The extensive employment of iron chains in machinery, and on ship-board, at the present day, has led to great improvements in their construction. The simplest kind of chain is the following, Fig. 1. This is frequently employed in jewellery; but unless the wire is strong, the chain is extremely fragile, the links opening at the slightest pull. Figs. 2 and 3 are representations of the patterns of other chains of the same slight description.

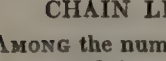


Fig. 1.

Fig. 2.

Fig. 3.

The first improvement in the formation of a chain in which strength was required, was the soldering or welding together of the links, and the usual form of these links was an oval, Fig. 4; and for all common purposes this pattern is still in use. In the case of iron chains, when the metal is united by welding, the workman having made the iron rod, of which the links are to be formed, red hot, cuts off with a chisel as much as is necessary to form one link. Having again heated this piece, he bends it into the form of a letter U over the beak of his anvil. He then heats the two ends of the link to a welding heat, and unites them by hammering; and forming the second link, he proceeds in the same manner, excepting that he introduces the new link into that last formed, before he welds together the two ends. The dexterous manner in which a good workman will join the links of a chain in this manner is quite surprising to those unaccustomed to see works of this nature performed.

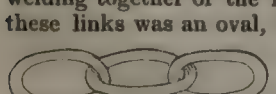


Fig. 4.

As chains of this kind would naturally wear out at those points where the links were in contact much sooner than at the sides, the plan of making the ends of the oval thicker than the sides was resorted to; and to save the workman's labour in reducing the iron in thickness in the necessary places, a machine was invented by which the iron was reduced in the proper manner, by passing it through steel rollers, so that the chain-maker had no more labour in making the improved link than one of the common sort.

Fig. 5 is a piece of the prepared iron, and a piece cut off from A to B is sufficient to form one link.

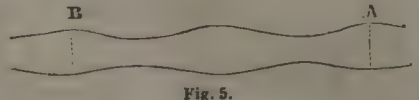
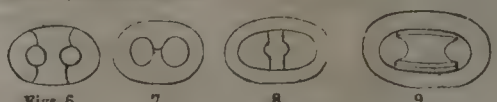


Fig. 5.

When chains made after either of these plans are subjected to an excessive great strain, their sides are apt to be brought together, and when that occurs, the freedom of movement of the train is impeded, and the chain becomes entangled. To prevent this occurring, several means were fancied, by placing stays of different forms across the link, so as to prevent it collapsing. Figs. 6, 7, 8, 9, show several of these contrivances.


Figs. 6. 7. 8. 9.

A very curious chain, or metal rope, is employed in some of our collieries. It is made of wire, three-eighths of an inch thick, twisted into coils, as in Fig. 10.

Fig. 10.

The chain of a watch is very curiously constructed. Fig. 11 is an enlarged view of several of the links. A chain of this description, made on a larger scale, is used in coal-mines, as well as another of the following construction. (Fig. 12.)

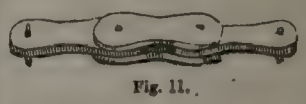


Fig. 11.

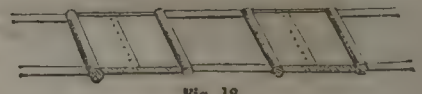


Fig. 12.

He who is wise enough in youth to take the advice of his seniors, unites the vivacity and enterprise of early, with the wisdom and gravity of latter life; and what can you lose by at least asking their opinion, who can have no abstract pleasure in misleading you; and who can, if they please, furnish you with a chart of that ocean, to many unexplored, but over which they have passed, while thousands have perished there for want of that wisdom they are willing to communicate to you. The ancients fabled part of this lesson in the history of Phaëton, who vainly attempted to guide the chariot of Apollo. The world is too much for juvenile sagacity, and he must have become grey-headed who is wise enough to walk in and out amidst the machinery of Nature, and the subtleties of human life, without being either crushed by the one, or duped by the other.—Andrews.

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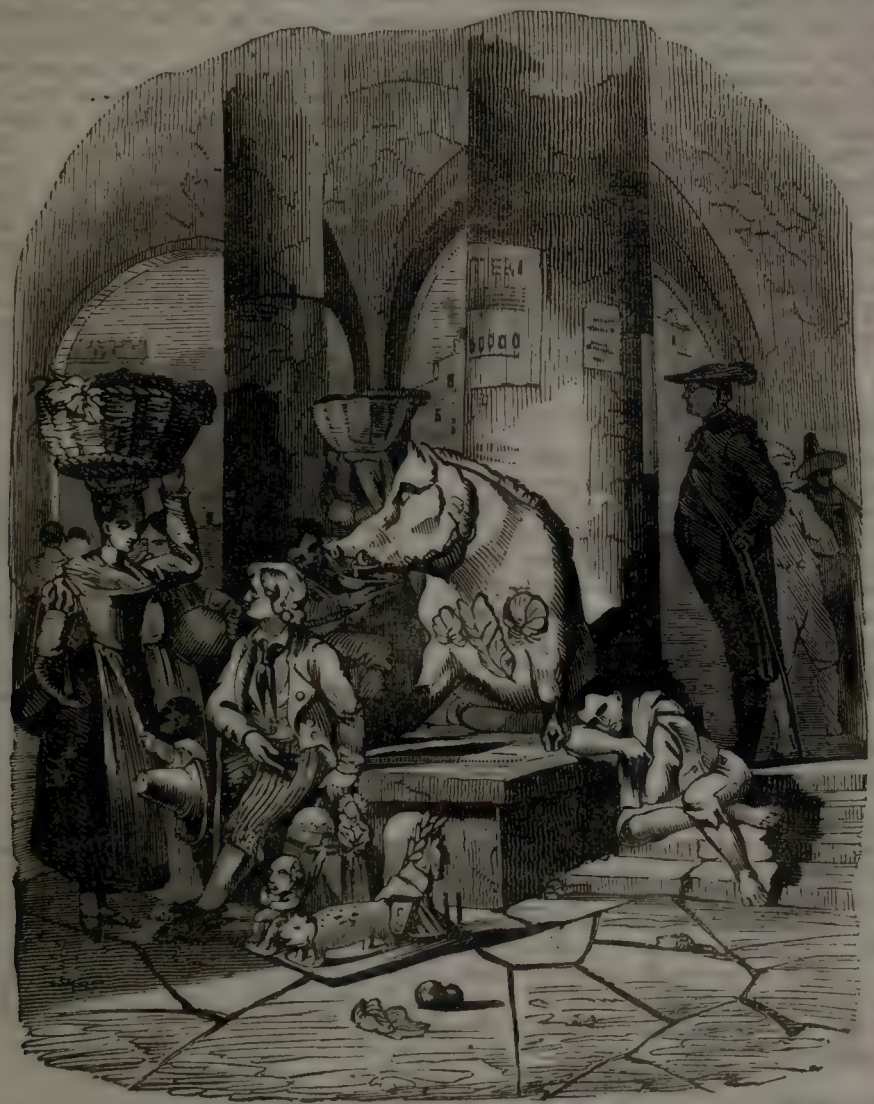
FLORENCE AND THE FLORENTINES. II.



FOUNTAIN OF THE WILD BOAR, AT FLORENCE.

THE CATHEDRAL—THE CAMPANELLO—THE MISERICORDIA—MICHAEL ANGELO—DANTE—MACHIAVELLI—GALILEO.

SANTA MARIA DEL FIORE, the cathedral of Florence *, was one of the first ecclesiastical edifices of Italy whose construction deviated from the pure Gothic, though it still retains more of that than of any other style. It was commenced by Arnolfo di Lapo, in the year 1289; this artist dying, was succeeded by Giotto, who, originally a shepherd boy, became a pupil of Cimabue, the founder of the Florentine school of painting. Giotto built the Campanello, or steeple, and changed the original façade of the building to make it more in unison with this tower; his successors were Donatello, Gaddi, Lorenzo di Filippo, and Brunelleschi, which last celebrated artist designed and nearly finished the execution of the cupola, or dome, in 1428.

A higher compliment could scarcely be paid to this monument than that of Michael Angelo, who desired to be buried in a spot in the church of Santa Croce, from whence this dome could be seen; his wishes, however, on this point, were not complied with; although buried in Santa Croce, the dome is not visible from his tomb.

Notwithstanding the wonder and pleasure experienced by architects on viewing this work, it disappoints the general observer: the dusky red tiles with which it is roofed form a dismal contrast to the tesselated marble of the remainder of the building; its octagonal shape and general heaviness of appearance being unrelieved by columns or galleries, leave but the impression of imposing bulk.

* See *Saturday Magazine*, Vol. IV., p. 2.

The cathedral has no façade, the space allotted to this being a plastered brick wall on which some high Corinthian columns were rudely painted in fresco, for the marriage of Ferdinand Medici; the design of this fresco can still be traced, but is nearly effaced by time, and the front now offers little more than a blank space of dead white; variety of opinion of the successive architects, is stated to be the reason of the non-completion of the façade. This imperfection exists in several of the churches of Florence: want of money and continuous change of government during the turbulent period of the republic, are probably the causes; it is, however, extraordinary that it should happen so repeatedly, and that three or four churches should be commenced before one be well finished; still more extraordinary that the later archdukes of Tuscany have suffered this eye-sore to exist unaltered, and to detract so much from the beauty of their metropolis.

The Campanello, which stands at a few feet distance from the south-west corner of the church, is a production of surpassing elegance; the black and white tesselated marble with which it is encased is much better adapted to this light gracefully-proportioned structure than to the mountain mass of the church itself; at the same time it does not deteriorate, but rather improves the appearance of the latter, by its juxta-position; it was erected, as before stated, by Giotto, in 1334, about thirty years after the death of Lapo. "Beautiful as the Campanello," is stated to have been a favourite expression of the Florentines, whose pride in national monuments is evinced by the characteristic resolution of their municipality for the building of this church, in which document, it being "considered meet that the magnificence of a people should shine forth in the monuments it caused to be erected," Arnolf was enjoined to form the model of a work "than which man could imagine nothing grander or more beautiful."

Resounding from the Campanello is occasionally heard the booming of a deep-toned bell; this is to summon the *Confratelli della Misericordia*, or Brothers of Charity. This institution, the most Christian in its nature and effects of any we meet with in Catholic countries, is reported to have been founded after the memorable plague of the fourteenth century, by the survivors of those humane spirits who devoted themselves to attendance on the sick, the dying, and the dead; and to the sick, the dying, and the dead, have its good offices ever since been devoted. It is purely voluntary, the brother taking the vows for any period of time he thinks fit; it has the peculiarity, unknown to other monastic institutions, of not excluding from worldly affairs, though these are never permitted to interfere with its duties.

The members belong to all ranks, and the prince and the peasant, the master and his servant, the rich man and the pauper, walk side by side clothed in the same dress, and equally assiduous in ministering to the sufferings of their fellow creatures. On the sound of the bell above mentioned, all those who are on duty for the time leave their present occupation, be it what it may; the nobleman leaves his partner at the ball, the tradesman his business, and meet at the small chapel near the dome, where, having put on a dress which entirely conceals the person, they are directed to the object which requires their aid; they remove on a bier the sufferer, and convey him to the hospital. Should he be poor, they supply him with food and medicine until he recovers, or in case of death, bury him decently; but the better circumstanced person can always command their services, in which case they are generally reimbursed their expenses, in order not to encroach on the funds. It is also incumbent on them to attend the prisoner condemned to death, and administer the last office of consolation. The late archduke of Tuscany, Leopold, is reported frequently to have officiated; the present duke is also a member of the brotherhood. It is said that the bell has never tolled without assembling double the number required. There is one beautiful rule of this society, which requires, if a Catholic and heretic be found injured in the street at the same time, that the heretic be taken up first; the founders made attention to the heretic imperative, considering it certain to the Catholic patient. A sermon is annually preached, and contributions made by the English Protestant congregation, in aid of this charity; and we need hardly add, that in no part of the world is British liberality ever appealed to in vain for benevolent purposes.

The appearance of the Confratelli, as they march with solemn step, bearing a litter or bier, clothed in a black domino and cap with eyelet-holes (see Engraving in page 184), is strange, and impresses the beholder with awe; they look more like the hooded ministers of inquisitorial vengeance, than the humane votaries of the chiefest Christian virtue.

Opposite the gates of the cathedral is the small octagonal church of St. John, now used as a general baptistry for the city, the three bronze gates of which are celebrated as the most beautiful castings extant; the southern one was made by Andrea Pisano, and was honoured by a visit of the seignory of Florence, who conferred upon the artist the freedom of the city, a distinction at that time envied by princes. The construction of the other two was, at a subsequent time, thrown open for competition to the Florentine artists, among whom were Brunelleschi and Ghiberti: the specimen of the latter (the subject being the sacrifice of Abraham, and now preserved in the Royal Gallery) was decided to excel, and he produced two gates, one of which was so exquisite as to be called by Michael Angelo, the Gate of Paradise; it faces the cathedral, and exhibits, in twelve compartments, events from the Old Testament; over each gate are three statues representing passages in the life of St. John. Mixed with these beautiful specimens of art is a relic of barbarism, exhibited in the frustra of two porphyry columns, from which are suspended iron chains. It is a curious circumstance that these trophies record, at the same time, the friendship and enmity of the Florentines and Pisans; the former, namely, the columns, having been taken by the Pisans from the Saracens, and presented to the Florentines for guarding their city; the latter having been torn from the gates of Pisa by the Florentines, when conquerors. This custom of hanging trophies of conquest on temples of worship has existed in all ages; we ourselves are not entirely exempt from it, but it would seem that more acceptable offerings might ornament the temple of a Divinity than those which commemorate the slaughter of His creatures; that more acceptable thanksgivings for victory or deliverance may be rendered than those which tend to perpetuate unchristian arrogance in the victors, and to renew hostility by wounding the feelings of the vanquished.

The church of Santa Croce, surnamed the Mecca of Italy, from the pilgrimages of visitors to the tombs of its illustrious dead, is, in the purpose to which it has been applied, analogous to our Westminster Abbey, having been appropriated to the burial of the most eminent Tuscans. Within its walls are the tombs of Galileo, Michael Angelo, Machiavel, Alfieri, and a cenotaph lately erected to Dante, who was buried at Ravenna. The Florentines, who banished him their

territories in his life-time, were subsequently very anxious to recover his remains, but the Papal government would never give them up: on his actual tomb are engraved the words—*Parvi Florentia, mater amoris*—expressions attributed to Dante himself. His banishment was incurred by his inflexible adherence to the Ghibelline party, one of the great political factions which then agitated the republic: during his life-time the opposite faction of Guelphs had constantly the upper hand. At one time he was condemned to be burnt alive if he should attempt to return. The present cenotaph, executed by Ricci, is surmounted by a somewhat colossal statue of the great poet, crowned with laurel, and supported by weeping figures, emblematic of Italy and Poetry.

The tomb of Michael Angelo is graced with a bust said to be a perfect resemblance of the eminent man whose dust it encloses; beneath are figures of the sister arts, Sculpture, Painting, and Architecture, in all which he excelled. Michael Angelo was born at Florence, and when apprenticed to the painter Ghirlandajo, visited the collection of objects of art in the Casa Medici, which, by the liberality of its possessor, was then generally open to artists and amateurs; here, when working on the head of a friar, he was observed by Lorenzo Medici, surnamed "the Magnificent," who took him under his protection, and fostered a genius the most daring, the most original, and perhaps the grandest, that Italy has produced.

On the tomb of Machiavelli rests a figure emblematic of Politics and History, the branches of literature to which he was devoted. The object of his treatise entitled "The Prince, or Instructions to an absolute Monarch," is much contested, and the term Machiavelism is generally applied to political hypocrisy; but the better opinion seems to be, that, in pointing out the only way in which a tyrant could govern, he wished to expose the evils of despotism.

Galileo *, the inventor of the telescope, the discoverer of the satellites of Jupiter, the confirmer and expounder of the Copernican System, (viz., that the earth is not stationary, but revolves round the sun,) was for these crimes imprisoned and condemned to death; he only escaped by retracting publicly, and on his knees, the heresy of truth. His bust, exhibiting a finely developed head, adorns his sepulchre; on either side is a figure of Astronomy and Geometry; a long inscription records his discoveries.

Santa Croce covers the remains of many others of the distinguished of Italy. The chapels are ornamented with sculpture by some of the first masters. The body of the church is a plain spacious Gothic structure, the roof supported by naked rafters. Its pavement has probably been more trodden on by the gifted and illustrious of modern times, than any other spot on the surface of our planet; such, from all parts of the civilized world, converge to this focus, to pay a tribute of admiration and respect to the memory of kindred spirits. G.

* See *Saturday Magazine*, Vol. II. p. 59.

RECREATIONS IN NATURAL PHILOSOPHY.

No. VII.

On Falling Bodies.

When a child begins to play with its toys, it soon learns by practical experience, that the ball or the rattle, falling from its hand, descends to the floor, or, at least, to a lower station than the hand. If the ball ascended towards the ceiling, instead of descending to the floor, the child would not mark it as extraordinary, since it has, in the outset of its experience, no reason to believe that the ball would choose one path in preference to the other. The child finds, however, that the floor of the room becomes the general receptacle of bodies falling from the hand or from the table. When the child becomes a schoolboy, he knows that the universal light-artillery of the boy, namely, stones, on being hurled into the air, descend again to the earth: he knows, also, that if the branch of a tree, on which he has ventured, in the unfeeling and cruel pursuit of nest-robbery, should break, that the earth would receive him with him unkindly concussion. All his experience, in short, as a child, a boy, and a man, convince him that bodies, when free to move, have a general tendency to fall downwards, and not upwards.

It may appear absurd to talk of a body falling upwards; but the absurdity is only apparent; for we find that many bodies move upwards with considerable velocity: smoke, vapour, steam, air and fire-balloons, &c. This, however, is a subject which will engage our attention in a future article; our present object being to inquire why it is that bodies fall to the earth, and the general laws which regulate such fall.

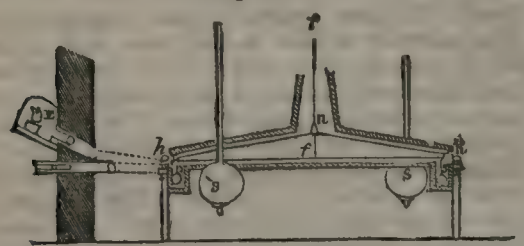
Every body which falls to the earth is an example of a species of attraction, called *gravitation;* and this attraction operates also among large masses of matter placed at a remote distance from each other, with a force proportioned to the quantity of matter contained in such bodies, and the distance between them. But the attraction of the earth for all bodies placed upon its surface, is so much stronger than their attraction for the earth and for each other, that the latter attraction is absolutely inappreciable by all ordinary modes of observation. Although two stones falling to the earth, not only attract each other, but attract the earth also in a small degree, they are attracted with so much greater force by the earth, that we cannot appreciate any other kind of attraction than that which results from gravitation.

The great Newton discovered and established the law of universal gravitation, "that every particle of matter in the universe attracts every other particle, with a force varying inversely as the square of the distance:" by which is meant, that if a body be attracted by the earth for example, with a certain force, and be afterwards removed to twice that distance, it will be attracted not *half* as much, but only one-*fourth* as much as it was at first; and if removed to three times the distance, it will be attracted only one-*ninth* as much as at first; a number multiplied by itself is the *square* of that number; thus, four is the square of two, nine is the square of three, and so on. We may, therefore, probably suppose, that if a stone were allowed to fall down a precipice by the side of a mountain, that its motion would be directed towards the mountain itself, and not to the earth: or we may go further, and inquire why it is, if one body attracts another, that houses do not move towards each other, or set out on an excursion to some large mountain in their vicinity. Now, we have already said, that gravitation acts with a force proportionate to the quantity of matter, and since no body on the earth contains so much matter as the earth itself, the attraction of the latter predominates over that of all other bodies placed upon it. Houses are fixed to the earth so strongly by their gravity, that neither can other houses, nor the mountain, move them from their position; but that the attraction of a mountain affects the perpendicular attraction of the earth, has actually been found by direct experiment. A plumb line suspended at the side of part of the mountain chain of Chimborazo, in Peru,

indicated a deviation from the perpendicular of 7″ or 8″, due to the attraction of the mountain. Another experiment made by Maskelyne on the attraction of Schechallien, a mountain in Scotland, indicated a deviation of 54″.

But the most accurate and celebrated experiments on this subject were instituted by Cavendish, which we will shortly notice, since the subject is as important as it is curious and instructive. This distinguished observer imagined, that the attraction of matter for matter could be palpably shown, by having a long thin rod with small balls at each end, (as shown in fig. 1,) accurately balanced in a horizontal

Fig. 1.



position by a fine thread attached to the middle point, as at *f*. This lever, it was imagined, would oscillate backwards and forwards horizontally, by the attraction of two very large balls brought near its ends on opposite sides. These balls, s s′, were of lead, and were brought near the small balls when the lever was perfectly at rest, and on opposite sides, in order that the effect of each might be to move the lever in the same direction. In this state the lever was set in motion by the attraction of the balls alone, and continued oscillating so long as the large balls of lead were near the small balls. The whole apparatus was enclosed in a room without doors and windows, in order to prevent disturbance from currents of air, &c.,—the room was illuminated by means of a lantern, E, and the observations made through the telescope below it. By means of this apparatus, Cavendish was enabled to learn the exact weight of the earth; he used it, in fact, as a pair of scales in which he weighed the world.

We do not pretend to assign any reason why masses of matter attract each other: this is altogether an inexplicable subject, but the laws which regulate such attraction are now well understood. We see the operation of this attraction on a grand scale in nature. The moon is a mass of matter about one-fourth the diameter of the earth, and her attraction is made manifest to us by the phenomena of the tides, which are occasioned by a portion of the waters of the ocean being drawn together at one place, as the moon is passing round the earth; the elevated bulk of water travelling round the earth as the moon travels. If a body very much larger than the earth were placed at a distance from it, the earth would move towards that body with more impelling force than the latter would move towards the former. Such is the case with the sun, whose diameter is a hundred times greater than that of the earth; and the earth is only prevented from falling on the sun, by the revolving motion which she has round him.

As a few familar illustrations of the attraction of matter for matter, we may notice logs of wood floating in a pond, or ships in still water, or corks, or other light bodies in a vessel of water; they move towards each other and remain in contact; the wreck of a ship in a smooth sea, after a storm, is often seen collected in large heaps.

When we speak of a body being *heavy*, or possessing a great *weight*, we merely indicate the attraction of the earth for such body. If an iron ball, of a thousand pounds' weight were the only mass of matter in the universe, it would weigh nothing; since there would be nothing to attract it, so as to constitute its weight. By removing such ball from the earth in a balloon, we may prove experimentally by means of a spring-balance, that its weight diminishes in proportion as we recede from the earth. Indeed, astronomers have proved that a thousand-pound ball, if removed from the earth to the distance of the moon, would be diminished to five ounces: that is, the earth would attract such ball with a force of five ounces only, which would be called its *weight*.

When bodies fall to the earth, the first thing that strikes our attention is the great disparity between the rates of their descent. A leaden ball falls very quickly, and the autumnal leaf slowly, and we generally say, as a reason, that the leaden ball is very heavy, and the leaf very light. But this is not the reason. A sheet of thin paper falls more slowly than if such sheet be rolled up, so as to make a paper ball. It is evident in such case that the weight remains the same, although the time occupied in the descent varies greatly. Now there is another force, which we have not yet considered, which opposes the attraction of gravitation, and that is, the atmospheric air: this retards the descent of falling bodies, and the more so in proportion to the extent of surface which such bodies present to its action. If the air be removed, all bodies fall to the earth with precisely the same velocity. There is a beautiful experiment which is shown by means of the air-pump. The air is removed from a tall glass vessel; a coin and a small feather, placed upon a moveable stage at the top, are allowed to fall at precisely the same instant, and they reach the bottom of the vessel together. In fact, *in vacuo*, a cannon-ball of a hundred pounds' weight would fall no quicker than a piece of paper; and a mountain would descend no quicker than a feather. The reader may try a simpler experiment for himself. A piece of paper, of the same size as a penny-piece will fall more slowly through the air than the coin; but if the paper be placed close upon the coin, the latter will prevent the air from retarding the descent of the paper, and so both will reach the ground together.

Since bodies fall with the same velocity, let us now inquire into the degree of rapidity with which they fall: that is, what relation exists between the space through which a body falls, and the time which it employs in falling.

It must be evident to the reader, that if any force which sets a body in motion ceases not to exert itself at the moment when the body begins to move, but continues in constant operation, that the motion of such body cannot be uniform, but goes on moving quicker and quicker every moment. A body is moving much faster towards the end than at the beginning of its fall. If we allow a ball to fall from the hand, we can catch it the first instant; but in a very little time it moves too quickly to be overtaken. We may leap from a chair or a table without injury; but a fall from the top of a house would fracture the limbs, because during the descent such a velocity is acquired that the earth is struck with great force. The force, indeed, with which a body reaches the ground is composed of all the forces which the body received during every instant of its descent. Now it has been ascertained that a body falls through 16$\frac{1}{12}$ feet during the first second of time of its descent; three times that distance in the next second, five times that distance in the third, and so on, according to the odd numbers 7, 9, &c. If a stone be allowed

to fall from the edge of a precipice, or into a deep well, and it occupy six seconds in descending, we can easily calculate the depth of the precipice or of the well.

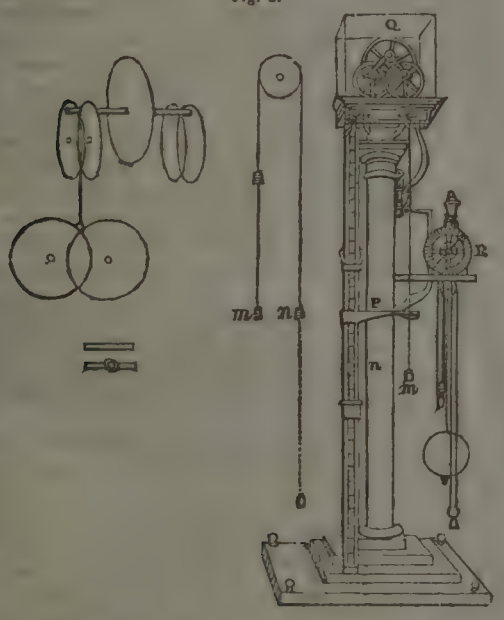
The stone fell during the first second, say	16	feet.
During the next	$3 \times 16 = 48$	„
During the third	$5 \times 16 = 80$	„
During the fourth . . .	$7 \times 16 = 112$	„
During the fifth	$9 \times 16 = 144$	„
And during the sixth . .	$11 \times 16 = 176$	„
Making the depth equal to . . .	576	feet.

But this process can be shortened by the following rule:—Multiply the number of seconds by itself, and the product by 16; thus, in the above example, $6 \times 6 = 36$, and $36 \times 16 = 576$ feet.

It will be interesting to the reader, to know the means by which this important law was discovered. Fig. 2 is a representation of Mr. Atwood's machine; a contrivance by which the motion of falling bodies may be retarded to any desired extent, without otherwise altering the character of the motion.

In Fig. 2 we have a wheel swinging on its axle, with very little friction, with a groove at its edge to receive a string; to this string equal weights, *m n*, were attached, so that balancing each other no motion results. To one of the weights, *m*, an additional weight was added, so as to make it preponderate slightly; the loaded weight would, therefore, descend and draw up on the other side the unloaded weight. The descent of the loaded weight, in such case, was found to be a motion of precisely the same kind as the descent of a body falling freely by the full force of gravity.

Fig. 2.



In order that the circumstances of the descent might be better observed, the wheels Q, (the construction of which is shown in a separate part of the figure,) were mounted upon a pillar, P, which is divided to inches and halves; a pendulum, n, vibrating seconds, forms part of the apparatus. The weight, *m*, may also, by this arrangement, continue loaded during a portion only of its descent, by placing upon it one of the slips of metal shown in the figure: the weight, in falling through the ring near R, leaves upon such ring the metal slip, and continues to descend by virtue of its acquired velocity.

As an easy illustration of the value of this machine, let us suppose *m n* to be weights of two pounds each, balancing each other, and that to *m* a weight of one pound be added; the weights will, of course, be set in motion, but the attraction of gravitation has to overcome the inertia of five pounds, since the two two-pound weights must move as quickly as the one-pound weight moves; and thus the velocity, being reduced to one-fifth of what is natural to a falling body, the circumstances of the descent can be minutely observed.

THE VIOLIN.

No. I.

History of the Violin.

One of the great objects of music is to appeal to the imagination by a resemblance, more or less perfect, of the human voice, in all its various modulations and inflections, whether under the influence of poetry, and the sentiments generally, or of the intellect, the passions, the tastes and the feelings. Accordingly we find that the impression which music produces on different individuals, is greatly modified by the constitution of that individual's mind. A person of a poetical temperament, associates with a beautiful air some of the most charming results of the muse. Music, though not martial, reminds the soldier of the camp. The pure mind of devotion also connects with music some of its brightest associations; and the mind, under the influence of hope or melancholy, associates words with the beautiful harmonies of a well-appointed band of instrumental performers.

But thou, O Hope, with eyes so fair,
What was thy delighted measure?
Still it whispered promised pleasure,
And bade the lovely scenes at distance hail!
Still would her touch the strain prolong,
And from the rocks, the woods, the vale,
She called on Echo still through all the song;
And when her sweetest theme she chose,
A soft responsive voice was heard at every close,
And Hope enchanted smiled, and waved her golden hair.

* * * * * * *

With eyes up-raised, as one inspired
Pale Melancholy sat retired,
And from her wild sequestered seat,
In notes by distance made more sweet,
Poured through the mellow horn her pensive soul:
And dashing soft from rocks around
Bubbling runnels joined the sound;
Through glades and glooms the mingled measure stole:
Or o'er some haunted stream, with fond delay,
Round a holy calm diffusing,
Love of peace and lonely musing,
In hollow murmurs died away.
But O, how altered was its sprightlier tone,
When Cheerfulness, a nymph of healthiest hue,
Her bow across her shoulder flung,
Her buskins gemmed with morning dew,
Blew an inspiring air, that dale and thicket rung,
The hunter's call, to faun and dryad known:
The oak-crowned sisters, and their chaste-eyed queen,
Satyrs and sylvan boys were seen,
Peeping from forth their alleys green;
Brown Exercise rejoiced to hear,
And Sport leapt up, and seized his beechen spear.

We have given a copious extract from Collins's enchanting ode, because the whole poem shows so eloquently the real influence of music on the human mind. A poet of a kindred genius says,—

The soul of music slumbers in the shell,
Till waked to rapture by the master's spell;
And feeling hearts—touch them but rightly—pour
A thousand melodies unheard before.

There is probably no instrument which imitates the human voice, or appeals to human sympathies so well as the violin. Its variety of tones, delicacy of execution and brilliancy, have assigned it an important

station among musical instruments in all ages. It may, therefore, be interesting to trace briefly the history of this instrument, from remote antiquity down to the present time, before we consider its construction.

Cardinal Maffei, in his treatise on ancient inscriptions and medals, published in the middle of the sixteenth century, represents a medal of Orpheus playing with a bow, upon an instrument resembling the violin, but which was called the *lyre*. The ancient Jews had instruments resembling the Violin, called the *nublium* and *psalterium*. Euphorion also describes an ancient instrument called *magadis*, which was surrounded with strings attached to a moveable pivot, and played with a bow. A similar instrument is described under the name *sambuce*. In Valerian's Hieroglyphics is a figure of a muse with a bass-viol in her hand. Philostratus thus describes the lyre of Orpheus:—"He supported the lyre against his left leg, and beat time by striking his foot on the ground; in his right hand he held the bow which he drew across the strings, turning his wrist slightly inwards; he touched the strings with his left hand, keeping the knuckles straight." This mode of playing has been witnessed by the writer on the Continent, within a few years; and the description of Philostratus will evidently apply to the modern viol-di-gamba, so called from the Italian word *gamba*, the leg, which serves to support the instrument. The word *plectrum* applies to the ancient violin-bow, but it is now uncertain whether the bow was not used merely to strike the strings.

In the middle ages we find various descriptions of violins. The troubadours, and the *minne*, or *love* singers, were often called *violleurs*. This instrument was also in high repute in the monasteries, where there are still preserved cases of violins, violas, and lutes, beautifully ornamented with ivory, gold, and silver.

The Violin owes its modern shape to a series of gradual changes effected through the taste or caprice of a succession of eminent performers. Arcangelo Corelli, a native of Bologna, is considered as the father of fine violin players. He was the founder of what is called the Roman school. He died at the age of sixty, in January 1713. The celebrated Tartini was born of a noble Venetian family. He was first violin-master of the church of St. Anthony in Padua, and died in 1770. The Violin was greatly cultivated in Germany during the last two centuries.

In France this favourite and national instrument was introduced to general notice by the Italian, Baltazarini, who was sent by Marshal Brissac to Catherine de Medicis. Lully was in high repute in the time of Louis the Fourteenth, about the year 1652. The French Conservatoire has furnished France with numerous brilliant performers. In England the Violin became popular at the Restoration. Charles the Second had a band of violin tenors and basses, the leader of which was the Swede Baltzar, the first violinist of his time. The Englishman, Banister, succeeded Baltzar; but towards the end of Charles's reign, the Italian, Nicolas Matteis, arrived in England, and completely eclipsed all former players; his style of bowing and his shakes are said to have been remarkably beautiful. Francisco Geminiani, born at Lucca about 1666, a pupil of Corelli, and leader of the orchestra at Naples, was a great improver of the style of playing. Veracini, a fine player, and a good composer, appeared in London in 1715. He was followed by Giardini in 1750, who astonished the English public by the elegance of his bowing, his chaste and correct embellishments, and his extempore variations of popular airs. Cramer, Corbett, Dubourg, Clegg, and the two Pintos, appeared as first-rate Violinists during the last century, at which we pause, for it would occupy us too much to mention even the names of the talented individuals of the present century, who have successfully cultivated this beautiful and difficult instrument.

In a second short article, we propose to say a few words on the construction of the instrument.

THE PASSING BELL.

Of those who will read these pages, there are few probably that have not felt at some period of their lives, the emotions naturally awakened by the Passing Bell; few that can have listened to its slowly-repeated intonations, at any hour of the day, but more especially when the shades of evening are gathering thickly around them, without having been seriously affected by its solemn and melancholy accents. The deep low vibrations of that well-known knell, not merely when falling heavily on the ear from the neighbouring bell-tower, but even when wafted in softer tones from a distance, speak a language which seldom fails to meet with a ready response in the recesses of the human breast. But possibly it is in the lengthened pauses which, on a principle, exquisitely in character with the solemnity of the occasion, are permitted to elapse between each sound, and which seem to tell us that the bell *labours* to be vocal, and *with difficulty* finds itself a tongue, that we discover the peculiar influence by which the heart is moved.

The *original intention* of the Passing Bell is now nearly forgotten. It appears to have been, to announce to a neighbourhood, in which a particular individual lay sick, the period when the soul was, as it were, *passing* out of the body. It told of the moments of man's last trial—it might be, of the mortal agony, the throes and struggles, which often constitute the "pains of death;" and consequently, as long as the sufferer lay thus in extremities, so long was the knell sounded. The peculiar purpose for which this announcement was made to the surrounding parishioners, was, that the dying person might have the benefit of their prayers in this most awful crisis of his existence. That this was the original design of the Passing Bell, is implied in its very name. It is also fully confirmed by the light thrown on the subject by those who have studied the history of the usage.

In a poem of an early English poet, named Heywood, there are these allusions to the use of the bell in his day:

> Come list; hark, the bell doth towle
> For some but new-departing soul.

And again—

> For hark, hark still, the bell doth towle
> For some but new-departing soul.

It is then, as announcing the last moments of a *dying* person, that the sounding of the bell is here represented. And further, Dr. Zouch is quoted, as calling the Passing Bell the "soul-bell," and as expressly saying that it was tolled *before* the departure of the soul, by way of signal for good men to offer up prayers on its behalf. It is clear, moreover, that the same view was recognised and sanctioned by authority, at a distant period, in the church of England. This appears from the following passage, which occurred in a set of Questions, addressed at a bishop's visitation to his clergy:—"In the mean while, is there a Passing Bell tolled, that they who are in the immediate hearing of it may be moved, in their private devotions, to recommend the state of the departing soul unto the hands of the Redeemer?" We are told also, that in the writings of our older poets there are many

allusions to the peculiar object of this pious custom. Amongst these the excellent Donne says, in admirable agreement with the observations just offered,—

Prayers ascend
To heaven in troops, at a good man's passing-bell.

Yea; christians of old were fully persuaded of the efficacy of prayer; and whenever and wherever the Passing Bell was heard

Swinging slow, with solemn roar,

"it was not unreasonably or uncharitably presumed that such prayers of the living, at that time, might be of service to the dying; or that, in this particular district, some one might be found, deserving of the name of Christian, who could not grudge a fellow Christian, a brother or a sister in Jesus Christ, while contending with the infirmities of his last sickness, or even in the hour of death, the benefit of his prayers and intercessions at the Throne of Grace." And surely there is something very beautiful in the usage of all the inhabitants of a whole parish or district being invited to unite together in showing an affectionate interest in the "soul's health" of a sick and dying brother, by praying for his spiritual comfort and support in his final trial; interceding more especially that, as our Church expresses it, the Almighty "may not suffer him, in his last hour, for any pains of death to fall from him." Let us consider well how much was understood in this Christian practice. It took for granted the existence of such a spirit of mutual kindness and good-will amongst Christians, one towards another, of such a reciprocity of purely Christian feelings in the neighbourhood or district in question, that should a fellow parishioner be now situated in the way described, when their prayers might help and assist him in his mortal struggle, actuated by the hallowed impulse of Christian friendship, full of this kindness, tenderness and sympathy for a brother Christian, they would willingly and cheerfully render to him this spiritual service; that, roused to attention, and admonished of his critical situation, their prayers would mingle with his own perhaps scarcely articulated aspirations, and, from the silence and privacy of their own dwellings, would ascend to the mercy-seat on high; entreating God graciously to be pleased to succour his suffering, his tempted, his dying servant, to be with him in his passage through the valley of the shadow of death, and to grant that his soul, when the hour of its final separation was come, might be numbered amongst those of the ransomed and redeemed for ever.

Most accordant with these remarks are the observations of the good Bishop Hall, which occur in one of his *Occasional Meditations*. Well, indeed, did he know how to give a practical turn to the instructions to be derived from that solemn sound!

UPON THE TOLLING OF THE PASSING BELL.

How doleful and heavy is this summons of death! This sound is not for our *ears*, but for our *hearts*; it calls us not only to our prayers, but to our preparation; to our prayers for the departing soul—to our preparation for our own departing. We have never so much need of prayers as in our last combat; then is our great adversary most eager; then are we weakest; then nature is so over-laboured that it gives us not leisure to make use of gracious motions. There is no preparation so necessary as for this conflict: all our life is little enough to make ready for our last hour. What am I better than my neighbours? How oft hath this bell reported to me the farewell of many more strong and vigorous bodies than my own—of many more cheerful and lively spirits? And now what doth it but call me to the thought of my parting? There is no abiding for me; I must away too. Oh, Thou that art the God of comfort, help thy poor servant that is now struggling with his last enemy. His sad friends stand gazing upon him, and weeping over him, but they cannot succour him: needs must they leave him to do this great work alone; none but Thou, to whom belong the issues of death, canst relieve his distressed and over-matched soul. And for me, let no man die without me, as I die daily, so teach me to die once; acquaint me beforehand with that Messenger, which I must trust to. Oh! teach me so to number my days, that I may apply my heart to true wisdom. D. I. E.

THE PASSING BELL.

Stop, O stop the Passing Bell!
Painfully, too painfully,
It strikes against the heart, that knell;
I cannot bear its tones—they tell
Of misery, of misery!
All that soothed and sweetened life
In the mother and the wife—
All that would a charm have cast
O'er the future as the past—
All is torturing in that knell!
Stop, O stop the passing bell.

Stop it! no—but change the tone,
And joyfully, ay, joyfully,
Let the altered chimes ring on,
For the spirit that hath flown,
Exultingly, exultingly!
She hath left her couch of pain;
She shall never feel again
But as angels feel—afar,
Climed beyond the morning star,
Agony and death unknown!
Let the joyful chimes ring on.—ROBERT STORY.

[From the *Sunday Reader*.]

A BRITISH SAILOR'S PRAISE OF THE SEA.

'Tis beautiful o'er grassy plain
To watch the racer's pride,
When white foam covers bit and rein
And streaks his glossy side
'Tis beautiful amid the pack
To urge the hunter's course,
While echo gives the clamour back,
And fires the maddened horse;
'Tis beautiful to hold command
Amid the cannon's rattle,
And, marshalled on the glittering land,
Survey the pomp of battle.
But, O! it is than courser's race
More beautiful by far,
Swift o'er the waves to speed the chase
In England's barks of war;
More beautiful than huntsman's cry,
When winds and waves contend,
To mark the writhing mast on high,
And see the canvass bend;
More beautiful than marshalled plain,
To guide the war-ship's motion,
And see her o'er the tempest reign,
A sovereign of the ocean.

'Tis sweet to hear the village bells
Ring out their merry round,
Or list, when evening curfew swells,
Far off the solemn sound;
'Tis sweet to hear the skylark weave,
At morn his heavenward song,
Or catch the wood-lark's notes at eve
The woodland path along;
'Tis sweet to mark, in rural scene,
Bright eyes with rapture glancing,
And to the pipe, on village green,
See village maidens dancing.

But, O! more sweet than warbling lark,
Or sound of village bell,
In summer round the moonlit-bark
The billows' murmuring swell.
More sweet than village maiden's dance,
Or pipe of rural wake,
The rippling waves, that, as they glance,
Their strange, wild music make.
Though sweet o'er England's fields to roam,
And rich her landsmen's treasures,
More sweet to me the seaman's home,—
More dear the seaman's pleasures.

[*The Rubi, a Tale of the Sea.*

THE MYXINE, GLUTINOUS HAG, OR BORER.

(*Gastrobranchus cæcus.*)

THE GLUTINOUS HAG-FISH.

THIS little fish, although seldom more than twelve or fourteen inches in length, is well deserving of notice, on account of its singular method of obtaining its food. The Myxine is found as far north as the shores of Scandinavia, and it is also of frequent occurrence on the British coasts, more particularly off Scarborough. It enters, says Pennant, the mouths of other fish when on the hooks attached to the lines, which remain a tide under water, and totally devours the whole except the skin and bones. The Scarborough fishermen often take it in the *robbed fish* on drawing up their lines. On this account it is called, on this part of the coast, the Hag or the Borer, because, as others say, it first pierces a small aperture in the skin, and afterwards buries its head in the body of its prey. It is most usually found in the body of the cod, or some other equally rapacious fish.

Its worm-like figure induced several systematic writers to class it with the worms, and "it was not till after dissections and published descriptions, that its true relations with the lampreys were acknowledged."

The Myxine, (says Mr. Yarrel,) is not uncommon at Berwick, but it is only to be obtained at a particular season of the year, in one or two localities, when, during fine weather, at the end of Spring, or the beginning of Summer, the fishermen lay their long lines, on a bank with a soft mud bottom, near the coast, when fishing for cod or haddock. It is considered by some, that the Myxine, which is without eyes, obtains access to the interior of the body of the fish by passing in at the anal aperture; others endeavour to account for its being found in the belly of a voracious fish, by supposing it had been swallowed; while many experienced fishermen still repeat their belief, that the Myxine enters the mouth of the cod-fish while it is hanging on the line. It is conjectured that the Myxine does not fasten upon any fish, unless it be either dead or hanging on a hook; but how a fish that is blind is able to find its way to a particular aperture, is a matter not easily explained. The eight barbules, or cirri, about the mouth of the Myxine are, there is no doubt, delicate organs of touch, by which it obtains cognizance of the nature and quality of the substances with which they are in contact, and its single-hooked tooth upon the palate enables it to retain its hold till the double rows of teeth, or the tongue, are brought into action, to aid the desire to obtain food."

Along the whole length of the under surface of the body, from head to tail, there are two rows of mucous pores, from which a large quantity of a gelatinous secretion is expressed occasionally, at the will of the animal, and by which, in reference either to its quality or quantity, or both, this fish is said to escape its enemies. So copious and so thick in its consistence is this jelly-like secretion, that some of the older naturalists believed this fish had the power of converting water into glue, and it obtained in consequence the name of the Glutinous Hag.

The body is long, and cylindrical throughout nearly its whole length, tapering and compressed near the tail; in colour the Myxine is dark-brown along the back, lighter chestnut-brown along the sides, and yellowish-white underneath.

The bones of the back in the lamprey are of a soft consistence, and indistinctly divided into rounded portions. In the Myxine, in place of a series of bones composing the vertebral column, there is merely a soft and flexible cartilaginous tube. The annexed engraving shows the structure of the mouth of the Myxine. It is to be observed, the parts are laid open to show the teeth: the tooth on the palate is seen about half way between the points of the nose and the four rows of teeth on the tongue

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COMPASSION is an emotion of which we ought never to be ashamed. Graceful, particularly in youth, is the tear of sympathy, and the heart that melts at the tale of woe. We should not permit ease and indulgence to contract our affections, and wrap us up in a selfish enjoyment; but we should accustom ourselves to think of the distresses of human life, of the solitary cottage, the dying parent, and the weeping orphan. Nor ought we ever to sport with pain and distress in any of our amusements, or treat even the meanest insect with wanton cruelty.—DR. BLAIR.

BROTHER OF THE MISERICORDIA.

See page 178.

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ELY PALACE HOLBORN.

AS THE BUILDING STOOD IN THE YEAR 1772, WHEN IT WAS PULLED DOWN.

In our former notice of the Bishop of Ely's Chapel and Palace in Holborn*, we brought down the memoir from the time of John de Kirkby, the original donor of the property, (who was consecrated Bishop of Ely in 1286, and died in 1290,) to the year 1531, when King Henry the Eighth and Queen Catherine were present at a banquet in the great hall of the palace. Above is a correct sketch of the court-yard, the colonnade, and south side of the old hall, over the chief entrance of which were carved the arms of the See of Ely; such having been the view which, before the edifice was pulled down in 1772, met the eye on entering from that part of Holborn Hill where the iron gates now stand. To give a correct idea of the relative position of the buildings, it may be mentioned, that the ancient Chapel of St. Etheldreda stands somewhat further northward, and would, consequently, be hidden by the hall. This hall, as seen in the engraving, is stated to have been a noble room, 74 feet long, standing east and west, lighted with six Gothic windows, and furnished in a manner suitable to the hospitality of the times.

The Ely estate in Holborn was so much enlarged and improved by purchases of land, and by buildings erected by successive prelates, that the whole, consisting of the palace, gardens, pastures, and enclosures, contained twenty acres, "or, as some say, forty acres†," in the reign of Queen Elizabeth. The Bishops of Ely from that period lost all real possession of the property, by their own surrender; to which, however, they were compelled by the crown. And this brings us to a painful period in our history: Elizabeth is said to have been struck with the graceful person and fine dancing of Sir Christopher Hatton, and to have promoted him to the office of Lord Chancellor, on the strength of these qualifications. His attention to business, however, and the sagacity of his judgments, appeared afterwards to justify the choice. Indeed, considering the penetration displayed by that great queen in the selection of her ministers and advisers, we cannot help thinking that the story of Hatton's having danced into his preferment, is a little piece of historical slander. Gray, speaking of this state Worthy, ironically observes, in his *Long Story*,—

> Full oft within the spacious walls,
> When he had fifty winters o'er him,
> My grave Lord-keeper led the brawls,
> The seal and maces danced before him.
>
> His bushy beard and shoe-strings green,
> His high-crowned hat and satin doublet,
> Moved the stout heart of England's queen,
> Though Pope and Spaniard could not trouble it.

* See *Saturday Magazine*, Vol. XIII., p. 129.

† Pennant.

In March 1576, on the queen's solicitation, Dr. Richard Cox, Bishop of Ely*, granted to Hatton the gate-house and other portions of the palace, including the long gallery, fourteen acres of land, and the keeping of the garden and orchards for twenty-one years; the latter paying at Midsummer-day a red rose for the gate-house, with ten loads of hay and 10*l.* per annum for the garden. The bishop succeeded in reserving to himself and his successors free access through the gate-house, walking in the gardens, and gathering twenty bushels of roses yearly. Hatton having undertaken to repair, and make the gate-house a convenient dwelling, laid out large sums upon the estate (about 2000*l.*), and, on this pretext, intreated the queen to require the bishop to alienate it to him wholly, including the garden. Cox, however, in a well-written Latin letter, remonstrated against this proposition, pointing out the inconvenience which would ensue to himself and his successors, from such a spoliation:—

That they would miss the orchard and meadow; besides, that his conscience would not allow him to accede to such a piece of sacrilege. That on becoming Bishop of Ely, he had received into his hands certain farms, houses, &c., which former pious sovereigns had thought fit to assign to the See. Of these things he ought to be a steward, not a scatterer. He reminded the queen of that golden rule, Not to do that to another which one would not have done to oneself; And that the profit of one person is not to be increased by the damage of another. He added, that he could scarcely justify those princes who transferred things intended for pious uses, to purposes less pious.

Neither these arguments, however, nor the acknowledged merits of the prelate, were allowed to prevail: against these were set the queen's regard for Hatton, and a debt which he owed to her Majesty, for she had accommodated him with money, which he was unable to raise. The issue of the correspondence was this; that the bishop should, by way of mortgage, convey to the queen, and the queen to Hatton, the house, gardens, &c., which were at that time on lease to him, but that they should be redeemable on the payment of the sum which was stated to have been laid out upon it.

The See of Ely remained vacant for nearly twenty years after Bishop Cox's death, no distinguished churchman being willing to accept a dignity burdened with such heavy charges and subjected to so many grievous annoyances as this appears to have been. Heton, who was the next bishop, demurred to the terms imposed, on which he received from the queen a strong letter beginning "Proud Prelate!" Understanding "that he was backward in complying with his agreement, she would have him to know, that she who had made him what he was, would unmake him; and if he did not forthwith fulfil his engagement, she would immediately unfrock him." This peremptory epistle was signed "Yours, as you demean yourself, ELIZABETH." Nothing was done towards paying off the mortgage above mentioned till the time of the learned and excellent Bishop Lancelot Andrews, who commenced proceedings in earnest to this effect, but was prevented from carrying them further by his translation from the See of Ely to that of Winchester.

Bishop Matthew Wren afterwards tendered the money, and obtained a sentence in the Court of Requests; but the Long Parliament put a stop to the measure in 1641, by the imprisonment of the bishop in the Tower, he having been impeached in the House of Commons for certain alleged practices in his diocese tending to popery. The speech of Sir Thomas Widdrington, a puritan member of parliament, on bringing in the bill, was full of invective. This speech, and the unreasonable charges against the bishop, form, together, a very curious document. Wren was imprisoned during the whole of the Rebellion, in which time the greatest and best part of the mansion was pulled down, the garden was built into tenements to the value of several thousands per annum, and Ely House was reduced to a very dark inconvenient dwelling, without any remains of its former splendour, except the ancient hall and chapel.

In January, 164⅝, this once magnificent palace was ordered by the Parliament to be converted into a prison; and the serjeant-at-arms was appointed keeper, with a special charge that the chapel, the garden, and trees should receive no injury.

During the troublous times which succeeded, Ely House was made the receptacle of wounded soldiers and sailors. Numbers of the poor creatures, who died there between 1648 and 1660, were brought to be buried in the churchyard of St. Andrew's, Holborn. The registers of burials in that parish abound with entries of this kind: there are literally hundreds. The following are extracts:

1650 December William Shawe a captaine out of Ely House died and was bur 19th

1650 William Ward a man a victler by Ely House Gate died and was bur 31st Dec

1652 December Elizabeth Vien a nurse-keeper to souldiers in Ely House was bur the 22nd

1653 Aprill A souldier dyed in Ely House and was buried 16 of Aprill 1653 But noe body knew his name He came in over night and dyed in ye morninge

1653 June A Dutchman whose name was not known, dyed in Ely House and was buryed the 18th

1653 Aug Robert Barker a man sometimes porter of Ely House and was buried the 2d

Oct Hannah Browning a maide in Ely House was buryed ye 28th Oct 1653

We also meet with the register of burial of Alexander Rigbey, one of the barons of the Exchequer, who died in Ely Rents, and of many other persons who occupied portions of these extensive buildings as tenants. By the last-mentioned entry, it appears that the baron died "on the 18th of August 1650, and was carried away the 2nd of September following to bee buried in Lancashire."

In March, 1660, it was referred to a Committee of the House of Commons to consider, "how the widows and orphans of the maimed soldiers at Ely House could be provided for and paid for the future, with the least prejudice to the nation; and how a weekly revenue might be settled for their maintenance, and how the maimed soldiers may be disposed of, so as the nation may be eased of the charge: and how they may be provided of a preaching minister."

Neither Wren, nor any of his immediate successors, by whom bills were exhibited in Chancery for the recovery of the property to the see, were able to make much progress in the matter, till Bishop Simon Patrick put an end to the law-suit which had so long existed, by accepting a fee-farm rent for himself and his successors, amounting to 100*l.* a year, settled on the bishopric.

It is no wonder that the several bishops in succession should have suffered great inconvenience from the despoiled and dismantled state of the palace. The gate-house having been taken down, they were compelled to enter the apartments reserved for them by an old back way. The rooms under these apartments were occupied by tenants, to whom the property had been underlet. Half of the Crypt, which is stated to have been once used for the interment of persons dying within the precinct, was frequented as a drinking place, where liquor was retailed; the intoxication of those assembled frequently interrupting the performance of divine service in the chapel above!

* This learned and pious Prelate took a leading part in the preparation of our incomparable Liturgy, he having before assisted in drawing up King Edward the Sixth's First Common Prayer Book.

Of the bishops of Ely who afterwards resided in the palace, some died there; and by the Chapel registers, it appears, that several baptisms and marriages were solemnized in it, by different clergymen, but principally by the bishops or their chaplains.

The premises at length fell into ruin and neglect, until, in 1772, in the time of Bishop Edmund Keene, an Act of Parliament was procured, enabling the See of Ely to dispose of the whole. Thus, after a possession of nearly five hundred years, Ely-House and the reserved grounds were conveyed to the crown for 6500*l.*, and an annuity of 200*l.*, payable to the bishops of Ely for ever; the town residence of those prelates being transferred to Dover-street, Piccadilly. The site and materials of the old buildings were purchased by Mr. Charles Cole, architect and deputy surveyor for the crown. He built Ely-place, of which he was the proprietor, and to which the chapel served as a place of worship.

In February, 1781, a trial took place in the court of King's Bench before William, earl of Mansfield, Lord Chief Justice, and a special jury, in which the said Mr. Cole, then an inhabitant of Ely-Place, was the plaintiff, and two magistrates of Middlesex were defendants, in an action of trespass for taking the plaintiff's watch to pay a poor's rate, under a warrant of distress signed by the defendants. The jury, without going out of court, found a verdict for the plaintiff, on the ground of the place being extra-parochial, which was entirely in accordance with the judge's charge. Lord Stowell remarks, that this verdict was probably obtained on the assumption of mistaken facts, or on some insufficient statement of all the circumstances. Ely-place has since been ruled to be liable to rates.

A register book belonging to the chapel, which is continued from one in the custody of the bishop of Ely, shows various entries of baptism between 1780 and 1802. A "memorandum" in the more modern book records, that Mr. Cole thoroughly repaired the chapel, and that it was re-opened in December, 1786.

With reference to an excellent clergyman, formerly the minister of this chapel, the following melancholy notice occurs in the *Gentleman's Magazine* for 1798.

Died, November 4, of *malignant fevers*,
The third son of the Rev. Mr. Faulkner:
On the 8th, aged forty, after preaching three times on the Sunday before, the Rev. William Elisha Faulkner, lecturer of St. Giles in the Fields, and minister of Ely Chapel:
And on the 12th, his youngest son.
His wife and second son were also attacked by the same disorder, and have recovered.

It now remains shortly to trace the history of the chapel to the present time. On the establishment of the Central School in Baldwin's Gardens, under the superintendence of the National Society for the Education of the Poor in the principles of the Established Church, the benevolent Treasurer of that institution considered Ely Chapel to be a suitable place of worship for the children and their parents. Acting upon this good design, he purchased it at a considerable cost, and presented it to the Society in 1820; assigning the whole management and direction to the Archbishop of Canterbury, and the Bishop of London, for the time being. It being supposed that the inhabitants of Ely Place and the adjoining neighbourhood would continue to rent the pews, the middle and side aisles were offered for their accommodation; and when the Central National School was transferred from Baldwin's Gardens to Westminster, the galleries which had been erected for the children were refitted for general use.

The expectations which had been formed having, in a great degree, failed, the Chapel was closed; but on the occasion of an appeal being recently made to the public, for supplying means towards the erection of additional churches in the metropolis, it became a subject of regret, that an ancient ecclesiastical building, in every respect calculated for the purposes of religious worship, should remain unoccupied. Accordingly, in the year 1836, at the instance, and under the sanction, of the Archbishop of Canterbury and the Bishop of London, Ely Chapel, after having been closed for five years, was re-opened for Divine service, which is now regularly performed, morning and evening. M.

A VISIT TO THE BLIND SCHOOL,
AT PHILADELPHIA.

* * * There was no public exhibition, but a private visit, with an order from a superintendent, furnished us with a much more favourable view. When I think of those sightless orbs, I can hardly realize that my name, which I now see so neatly printed, together with the watch-guard round my neck, in which I can detect no false stitch, is their work. After we entered, the teacher asked if I would like to have my name printed; on my answering in the affirmative, he called Mary Ann! A very pleasing looking girl of fifteen groped her way easily to the table, where the box of blocks was placed; the letters are pricked, not coloured. While Mary Ann was forming my name, she held a kind of converse with the blocks, now jesting, now scolding if the right letter did not meet her touch, but all in a low, pleasant tone. The name was completed without mistake in a few minutes. A little boy spelt at my request, and Mary Ann was next called to read a chapter from one of the Gospels in raised letters. She reads rapidly, but no oratorical tone has ever fallen with such power on my ears as the words of Jesus from the lips of that blind girl. The teacher then gave out arithmetical questions of great difficulty, which he himself worked on the black-board. Nothing could be more earnest or ambitious than the air with which they went to work to calculate, or the look of triumph assumed by those who were the quickest or the most successful.

At this period their music-master came. There was great eagerness and interest in their manner, and many a sly joke was whispered. They began with a German chorus, each part nobly sustained, the girls remaining in one room and boys in the other. I had been carried along by the variety and interest of the scene up to this point, not a little aided by the vivacity, even drollery, which characterized the manners of many of the girls; but now that their countenances were fixed, their sightless orbs mostly turned upward, and their voices swelling in a rich concert of praise and thanksgiving, my tears could not be restrained; fortunately the air ceased, and one of Mary Ann's slily whispered jokes restored me to self-possession. After the German followed several English airs, which were succeeded by instrumental music, combining violins, clarionets, flutes, horns, bassoon, bass-viol, forming in all a grand concert.

The music being over, the girls separated, and we visited the sewing apartment, where they began to collect, going unaided to their various occupations, making rugs, straw baskets, watch-guards, beadbags, &c. &c. As we descended to another room, we found Mary Ann at an elegant harp, which has lately been presented to the Institution by a Philadelphian. She was very shy, but consented to give us her first tune; another young lady played on the pianoforte.—Mrs. Gillman.

RECREATIONS IN NATURAL PHILOSOPHY.

No. VIII.

CENTRE OF GRAVITY.

THE beam of a pair of scales supported in the middle, remains in a horizontal position, and this it does even when we add many pounds' weight to the ends, provided the weight at one end is exactly equal to that at the other. The point of support upon which the beam turns, bears not only the balance-beam, but the weights attached to such beam also. In every solid, or collection of solids, there is a similar point of support, about which all the parts of such solid balance each other exactly, so that the whole mass is at rest: this point is called the *centre of gravity;* and although the attraction of gravitation acts upon every atom of the mass, provided the centre of gravity be supported, the whole mass is in equilibrium, that is, it is equally balanced.

It becomes, therefore, an important question how we are to know whether a body will fall when one part is supported, and the rest is not. We ascertain this by finding out the centre of gravity. This we generally do instinctively, without any foreknowledge of the mechanical properties of solids; but there is a large variety of instances where the architect or the engineer would be sadly at fault, unless he were enabled to determine the exact situation of the centre of gravity of the solid masses with which his works are constructed, and the situation of the same centre in a complete work which is intended to endure for ages.

If a solid be regular in its form, and uniform in its substance, such as a globe or cube of metal, the centre of gravity is evidently the centre of the figure; but in solids of irregular forms, a little calculation is necessary, in order to determine the exact position of such centre.

If a solid be attached to a string hanging from a hook in the ceiling, such solid being under the influence of gravity, will descend to the lowest possible point, and the string will, of course, be vertical. The centre of gravity, then, in every suspended solid, tends to the lowest situation which its support allows of. This is a consequence of the attraction of gravitation. The centre of gravity is in a right line with the point of suspension, and can therefore be found easily. If we bore a hole through the solid, in the exact direction of the string, so that if the latter were continued below the point at which it is attached to the solid, it would pass through this hole; and if we suspend the solid by different points on its surface, and bore holes through it from each point, as in the first instance, we shall find, on cutting open the solid so as to discover the directions of the several holes, that they all cross each other at one point within the solid, which point is its centre of gravity.

The reader may try this experiment for himself with a piece of pasteboard of an irregular form. Suspend it from its edge by means of a piece of string, and draw a line across the surface of the board in the exact direction of the string. Then let it be suspended from another part of the edge, and draw another line in a similar manner. The two lines will cross each other, and the point of intersection will be the centre of gravity of the pasteboard; for if a stout pin be thrust through this centre, the board may be made to turn upon the pin as an axis, and will remain at rest in any vertical position, whatever part of the edge may happen to be uppermost.

We see, then, that the centre of gravity in a solid, is such a spot that the weight of matter on opposite sides of it is equal, so that when that spot is supported, the tendency of the body to tilt up, or upset, is just as strong on one side as on the other, so that it remains neutral. An athletic man is sometimes exhibited, who places a child on the top of a ladder, and rests the bottom of the ladder on his own chin, and thus bears the whole. In this case, there is really but a small portion of the child's body exactly over the man's chin, (which is the *point of support,*) but the man so regulates the position of the ladder, that the centre of gravity of the whole shall be in a vertical line with his chin, so that the weight on each side is equal, and the tendency of the child to fall on one side is exactly equal to its tendency to fall on the other side, by which opposition of forces the child is equally balanced.

Similar instances may be met with under every variety of circumstances. We will state a few of the means for which the young student can himself provide. Insert the points of two knives into a stick, as in fig. 1, and the stick may be balanced on the end of the finger without the slightest difficulty. In this case, if we look at either knife separately, we shall see that it is wholly unsupported by the finger, for no part of it is directly over the finger, and its tendency is to bear the stick down in that direction; but if we regard the other side, we find that the other knife is placed similarly to the first, and that the tendency of one knife to fall, is precisely counterbalanced by the similar tendency of the other knife; neither one, therefore, can fall, and this explains what we mean by saying that, when the centre of gravity is supported, a body cannot fall.

There is another important remark connected with this experiment, namely, the situation of the point of support with respect to the centre of gravity.

The reader may possibly be surprised, to learn that the centre of gravity is not always situated within the body which is supported, but may actually be at a considerable distance from it. This requires explanation. We have said that the centre of gravity is that particular spot, about which all the parts of a solid balance each other: but it may so happen that at such spot there is a vacant space. A ring, for example, has for its centre of gravity the centre of the circle which such ring describes. We all know the extreme difficulty, and, to most persons, the impossibility of balancing a ring on the tip of the finger, and the reason is, because the centre of gravity is above the point of support: but we may easily balance such ring upon the point of a pin, by placing the pin within the ring, so as to balance it from the upper part of the inner circumference, in which case the centre of gravity will be below the point of support, as, indeed, is the case in the illustration afforded by fig. 1.

Fig. 1.

Fig. 2.

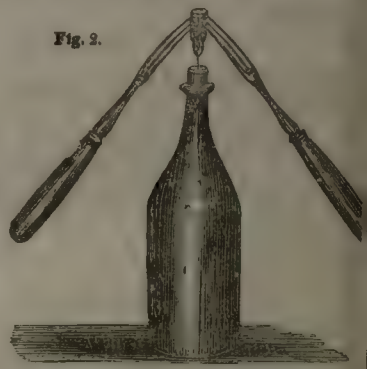


Fig. 2 is an amusing example of a similar kind, where a shilling is made to turn upon its edge on the point of a needle. Into the cork of a wine bottle insert a needle in a vertical position with its point

upwards; then cut a nick at one end of another cork, and insert a shilling; into the same cork insert two forks as shown in the figure, with the handles inclining downwards. If the edge of the shilling be placed upon the point of the needle, it may be turned round with considerable rapidity, and it will continue to rotate without any risk of falling off, because the centre of gravity is below the point of suspension.

The toy shown in fig. 3 is another illustration of the same kind. A dancing figure fixed to a ball E, and so placed upon the stand Z. However we may disturb this figure from its erect position, it turns and balances itself in all directions, and recovers its erect position as soon as the disturbing force is removed. The two weights F G evidently bring the centre of gravity of the figure far below the point of support, such centre being somewhere at or near Z, and as such centre always tends to the lowest point, it cannot attain such point without making the figure stand erect.

Fig. 3.

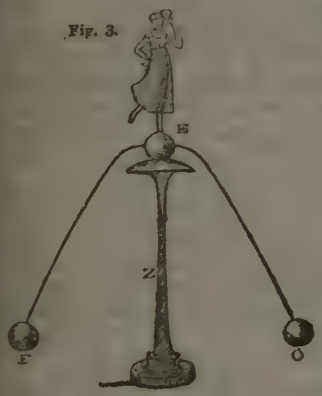


Fig. 4.

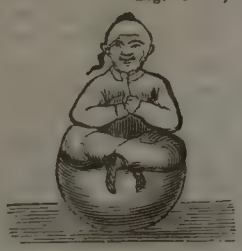


Fig. 4 is the figure of a laughing mandarin, and however much we may disturb his gravity, he soon recovers it, although he continues to laugh on. He is a light-bodied little fellow, sitting upon a very hard and heavy seat,—his body is made of pith, and his seat of lead; the latter being in fact the half of a leaden bullet; so that in consequence of the disproportion between the weight of the body and its seat, the curved surface of the latter, in any other position than that shown in the figure, will not have its centre of gravity at the lowest point to which it can descend. If we tilt the figure on one side, its centre of gravity is made to ascend, and on the removal of the disturbing force, it will descend to its original position by a series of oscillations which give to the figure a very funny effect.

In our next article we will bring forward some more illustrations on this amusing, but important subject.

Let thy hospitality be moderate; and, according to the means of thy estate, rather plentiful than sparing, but not costly. I never knew any man grow poor by keeping an orderly table, but some consume themselves through secret vices, and their hospitality bears the blame. But banish swinish drunkards out of thine house, which is a vice impairing health, consuming much, and makes no show. I never heard praise ascribed to the drunkard but the well-bearing his drink; which is a better commendation for a brewer's horse or a drayman, than for either a gentleman, or a serving-man. Beware thou spend not above three of four parts of thy revenues, nor above a third part of that in thy house; for the other two parts will do no more than defray thy extraordinaries, which always surmount the ordinary by much: otherwise thou shalt live, like a rich beggar, in continual want. The needy man can never live happily nor contentedly, for every disaster makes him ready to mortgage or sell, and that gentleman who sells an acre of land, sells an ounce of credit.—Lord Burleigh.

THE CIVET CAT, (*Viverra civetta.*)

The name Civet, which was first applied to the odoriferous substance produced by this animal, is of Arabian origin, but the animal itself has received the same appellation. There are several species of the genus *Viverra* which produce the civet, but that figured in our engraving is the animal from which it is most commonly obtained. It belongs to the carnivorous tribes, and is placed between the dogs and the martens, being less addicted to animal food than the animals constituting the dog tribe, and more so than the martens.

The Civets appear to be nocturnal animals, and hunt their prey at the same time as foxes and cats, surprising birds and small quadrupeds during the night. The species we are speaking of is about two feet four inches in length, exclusive of the tail; its muzzle is less pointed than that of the fox, but more than that of the marten; the ears are round and short; the lips furnished with long moustaches. The hair with which the body is covered is of a moderate length, and rather coarse; that which runs down the middle of the back is longer, and the animal is able to erect it when in anger. The general colour of the animal is a grayish brown, variegated with spots and bands of a darker colour; a stripe of this last colour runs the whole length of the body, from the nape of the neck to the tail; the sides are covered with irregular spots, which become larger near the tail and on the thighs. The head is whitish, with a large brown band, which, after surrounding the eye, comes down the cheek and passes under the chin. The Civets are found in all the warm parts of Asia and Africa, in Madagascar, and the East Indian islands.

In some parts of the East the Civets are taken alive, and retained in a state of captivity, for the sake of collecting the perfume for which they are famed. This perfume is produced by both sexes, and is contained in two cavities, or pockets, placed beneath the tail; these cavities are smooth internally, and covered with numerous small pores, connected with the glands from which it is secreted.

Civet is a perfume which was formerly in high repute in Europe, but it is at present very little used, excepting in the composition of some kinds of perfumery, to increase the power of other scents. That which is brought to England at present reaches us from the Brazils, Guinea, and the interior of Africa. When genuine it is worth as much as thirty or forty shillings an ounce. Pure civet is of a clear yellowish or brownish colour, about the consistence of honey, and uniform throughout. Undiluted the smell is offensively strong, but when mixed with other substances it becomes what some consider a fragrant perfume. Civet is often noticed by our older dramatists, and, although fashionable, was even then not to the taste of all; Massinger makes one of his characters say,—

> Lady, I would descend to kiss your hand,
> But that 'tis gloved, and civet makes me sick.

THE PASSING BELL.

No. II.

ITS PRESENT OBJECT.

WE have seen in a former paper, what was the original object of the Passing Bell, and considered the practical views taken on the subject by various writers, and more especially by that admirable pattern of Christian excellence, Bishop Hall. We may observe that he regards the sounding of the bell as leading Christians to meditations of a *two-fold* character;—as calling on those who then heard it, to consider the state of the dying person, and to pray for him; and also to consider their own state, and to make their best preparation, by prayer and other means, for their own departure. All this shows, that in Bishop Hall's day, (about 1640,) the Passing Bell was tolled *before* the death of a parishioner. Since that period, however, a change has been made in this particular. The bell, as we well know, does not now sound till *after* the spirit has already left its earthly tenement, though it is still entitled the *Passing* Bell.

> Hark! hark! it is the Passing Bell!
> It tolls—slowly it tolls—to tell
> Another soul is fled away*.

And this change in the usage, we may at once perceive, makes a correspondent change in *one* portion of the practical duties which was connected with it. The Passing Bell now announces *not* that the person is in the act of dying, but that he is already dead. Now, therefore, the Christian, when he hears the tolling of the bell, is no longer called upon to offer up prayers, as before, for the happy passage out of this life, for the individual to whose death it has reference. But still, on the other hand, we must recollect that one most important duty connected with the usage in question yet remains for us in full force. We must remember the announcement it gives to those who survive, that another human being has departed, and the warning held out by it to each of us, that we should hasten onward in our preparation for our own departure, which must come, we know not how soon, in God's own good time.

The practice may, indeed, be reckoned amongst the instances of becoming respect on the part of the living, to the memory of the dead. It is, in truth, no trivial occurrence, when rightly considered, when the Passing Bell proclaims that the common lot of humanity has removed another fellow creature from this fleeting state of existence. To him the change which has occurred in his condition, is most momentous and important. Eternal happiness, or eternal misery, one or the other of these things, is then become the fixed, unalterable condition of the departed. It is only becoming, that an event so solemn should be in some manner notified in the immediate neighbourhood where it has occurred; that there should be some public expression of serious sympathy, on the part of the survivors, with what has befallen one of their number, in which it is impossible that the rest, as fellow Christians, can be altogether uninterested. The living inhabitants of the same district will see their departed fellow-parishioner no more; and by his dissolution they must be conscious of a gap, a chasm, a vacancy amongst them. They meet him as one of their number—they see him in the sphere of their society—in their domestic, their social, or their religious intercourse, as they were accustomed—*no more*.

But it is not simply as a tribute of respect to the memory of the dead, not merely to tell of the demise of one of the living, but as a means of instruction to the surviving, that the sounding of the Passing Bell ought now to be considered. It is, as it were, the herald of the doom that awaits each of us and all; a proclamation of the common necessity we all lie under, of once dying. It is one remembrancer more, to remind us of the *approaching* period of our own departure. It may sound unwelcome in the ears of those who too much love this world; who have made *here* their homes, and whose heaven of enjoyment is centred upon some earthly object too dearly loved, some dream of earthly happiness too fondly cherished. But the wise, the serious, and the reflecting, will not turn a deaf ear, or a dead heart, to the friendly warning of these funereal notes, to the voice, as it were, from the tomb, which thus claims their attention. Amongst the many motives which call them daily to an increased spiritual energy, the sound of the Passing Bell will not be lost on them, but will contribute to rouse them more and more from the sleep of sense, and the torpor of worldly mindedness, to new life and activity, and to fresh exertions in their Christian career!

It may be well to remember, that, although the tolling of the Passing Bell is not now intended to admonish the parishioners to offer up their prayers for one of their number now at the point of death, there is still one occason on which something of a similar practice, designed for a similar purpose, still remains in our church,—a practice, however, which seems to be too much forgotten by all classes of Christians in general.

The custom (says Mr. Greswell,) which still prevails, or at least, from the rule to this effect in the Prayer Book of the Church of England, is supposed to prevail, of soliciting the prayers of the congregation for the sick, is not unlike what, in accordance with the original intention of the Passing Bell, was supposed to be notified by it. In both cases, the effect of the invitation to the living Christian was, or is, the offering up of prayer to God in behalf of his sick and afflicted, perhaps too, in both cases, his dying Christian brother; only in the latter instance, this is supposed to be done by the whole congregation assembled at church; whereas it was to be remembered in the private devotions of Christians, that the sounding of the Passing Bell, *in former times*, was presumed to be a memento.

Alas, no such sympathy for each other is generally felt, or expressed, amongst the members of the same community of professing Christians now. The Passing Bell has long ceased to be a warning to such a duty, which never called, and was never heard to call to its performance in vain. Christians, generally speaking, care not now for the death-bed scenes, the death-bed agonies and sufferings of each other. The parish bell, so far as concerns any such its *original and primary* purpose, has long become silent; and, in all probability, were its affecting signal again to be sounded, at the same crisis of a dying Christian's fate, and with the same tender and affecting solicitude in his behalf, as in former days—its solemn injunction, amidst the present apathy of truly reciprocal, kindly, and Christian feelings, would mingle with the winds, would be unheeded and lost, for any such pious and charitable purpose. Blood, affinity, friendship, indeed, have yet power to bind,—to procure for the living, for the sick, and dying, whether it be this good office, of which we are speaking, namely, prayer for their spiritual welfare, or any other expression of sympathy and kindness befitting their situation. But Christianity, abstractedly considered,—the idea that it is as component members of one mystical body in Christ Jesus, that Christians stand related to each other; if that be the only string we attempt to touch, the only sympathetic chord by which the emotions of the living may be excited in favour of the sick or dying; this is a language, which to modern Christians is a dead one; this is an appeal to which modern Christian sensibilities have no response: they cannot understand its meaning; they have ceased to feel its force.

There is too much truth in these remarks. Sick and dying persons do not seem to expect, for they very, very seldom request, the prayers of the congregation; and it is to be feared, that when such a request is made, the congregation, as a body, feel but

* Rev. William Lisle Bowles.

little interest in the spiritual welfare and comfort of their fellow Christians. Surely there is great scope here for a reformation; and it is clearly a reformation which *every* individual Christian may, *if willing*, assist in advancing. D. I. E.

THE PASSING BELL.

Hark! 'tis the bell, with solemn toll,
That speaks the spirit's flight
From earth to realms of endless day,
Or everlasting night!
"Ashes to ashes, dust to dust,"
Sin's awful curse demands;
Oh well! if, pure before the throne,
The soul accepted stands.
Oh well! for if uncleansed from guilt,
Through Christ's atoning blood,
With what dismay she now beholds
The presence of her God!
To live through an eternal death,
Eternal woe to bear!
Father of mercy! God of grace!
Inspire and hear our prayer!
From sin, the sting of death and hell,
From enmity to Thee,
Extend Thine own Almighty arm,
To set the bond-slaves free!
So when the bell, with solemn toll,
Shall speak *our* spirits' flight,
Angels their glad approach shall hail
To realms of bliss in light.—GISBORNE.

[From the *Sunday Reader*.]

THE REPLENISHMENT OF THE EARTH BY PLANTS.

THIS earth is a mass of vegetable life. In animals, the fact of replenishment is less visible; superior as the numbers are, and more numerous, too, as are the appointed species. The plants display themselves everywhere: they are the universal covering, the dress, of the naked earth: they are that life which would render the inanimate globe all one life, though not an animal existed. Did they not even perform the vast functions with which they have been charged, in reclaiming, extending, and improving the earth, in being the basis of animal life and existence, and in more, their very life and beauty would render the world a place of delight; as for this also were they ordained, commanded to abound, and commanded to luxuriate in more than conceivable variety. The abundance and the luxuriance may differ throughout the earth; but there is life everywhere; everywhere there is beauty; and everywhere there is utility and pleasure. The lofty mountains are clothed as densely as the plains below: if their tenants are less aspiring, they fill the rejected places and cover the hopeless; rendering the bare wall of rock a home for life, and ceasing not, even to the appointed boundary which separates that life from the eternal cold of death. Zones upon zones, from the mountain summit to the plain, and from the pole to the equator, produce their plants, their shrubs and their trees, increasing in stature and luxuriance and multitudes, as they approach the centre of light and heat; and, as they attain that, it is a perpetual contest of plants, which shall gain the superiority, and occupy the soil.

If, in the polar regions, the sun of a day brings out the whole mass of dormant life, to flourish as long as water can flow, it is but the same energy, the same command, which heaps life upon life in the tropical lands. And what Power, what Will but that could have covered with His life the arid desert, the surface of the waters, and the depths beneath the sea? —who but He to whom nothing is impossible; who, in creating difficulties, knows also how to conquer them?

Thus does He command the earth to be filled, and it is filled: thus does He say to His plants, Replenish ye the earth for ever; and it is for ever replenished. Let the casualties of the earth itself, let seasons, let animals, let man, destroy, consume, change, impede as they may, they shall not cease, they shall not fail anywhere, not for one year; the blanks shall be filled, the earth shall not remain anywhere destitute of life, nor anywhere shall His animals want that which He promised when He created them. If His rivers form new lands, if His sea quits the shores which He had first appointed for its bounds, if He raises new islands from the deep, and covers oceans with another earth, His plants are still obedient to His orders, and all is clothed, everything is replenished, that all may be full. The earth itself may fail; but He has assured us that while it stands, seed-time and harvest shall not fail; and His words are confirmed by His works.

If the cities of men are deserted or disappear, Nineveh is no longer known amid the world of plants from which it first arose, and the vanished towns of Lydia, and Pamphylia, and Phrygia have surrendered their foundations to that vegetable life over which man had obtained a brief conquest. If he but leaves his streets for a short summer, he returns to find that vegetation has resumed its rights and its place. Plants cover the walls of his abandoned castles, and even load the roofs above his head; they fill his imitative lakes and his canals, and incumber his made paths; causing him to remonstrate against the law which clothes his fields to enrich him. Even his ships cannot sail the sea without being detained by the universality and activity of vegetation: and it pursues him everywhere, in his walls, his vaults, his clothing, his books, his provisions, in everything. It overloads the very plants which he cultivates; and if it thus penetrates into his domestic intimacies, and assails him in that external world of life which he has selected for himself, so does it multiply to destroy those laborious architectures through which he desires to leave a name behind him, and to triumph over the ocean. Nothing is hidden from its activity, when it penetrates the mine as the vault, and when it has chosen to make a place for itself on the uncertrin, the unstable, and the deadly surface of the eternal mountain snows. This is indeed a perseverance, an obstinacy of vegetation, which, could we assign it to will, would imply an unconquerable determination to succeed in what it desired. But it is will: for it is His will. From the beginning He had determined that the earth shouid be filled with vegetable life; and His power for ever effects what His benevolence had planned.

[Abridged from MACCULLOCH's *Proofs and Illustrations of the Attributes of God.*]

THERE is a certain magic or charm in company, for it will assimilate, and make you like to them, by much conversation with them; if they be good company, it is a great means to make you good, or confirm you in goodness; but if they be bad, it is twenty to one but they will infect and corrupt you. Therefore be wary and shy in choosing, and entertaining, or frequenting any company or companions; be not too hasty in committing yourself to them: stand off awhile till you have inquired of some (that you know by experience to be faithful,) what they are; observe what company they keep: be not too easy to gain acquaintance, but stand off and keep a distance yet awhile, till you have observed and learnt touching them. Men or women that are greedy of acquaintance, or hasty in it, are oftentimes snared in ill company before they are aware, and entangled so that they cannot easily get loose from it after, when they would.—SIR MATTHEW HALE.

THE PROFILE MACHINE.

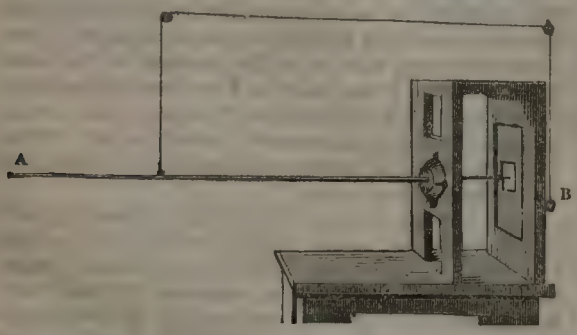
A PROFILE, or as it is also called a *silhouette*, is the representation of the outlines of an object filled up with a dark colour, so as to represent the shadow of the object; the ease with which these works of art are executed, has caused the art of taking profile likenesses to be very extensively practised. When carefully executed, the resemblance to the party intended is frequently very striking, especially if the features have a decided character. The fashion for this art arose in France about the year 1759. The word silhouette applied to shade-likenesses, is derived from Etienne de Silhouette, the French minister of finance in that year.

He strove by severe economy to remedy the evils of a war which had just terminated, leaving the country in great exhaustion. At the end of nine months he was obliged to resign his office. During this period all the fashions in Paris took the character of parsimony. Coats without folds were worn; snuff-boxes were made of plain wood; and instead of painted portraits, outlines only were drawn in profile and filled with Indian ink, &c. All the fashions were called *à la Silhouette;* but the name remained only in the case of the profiles.

In executing these likenesses the outlines were frequently drawn with a pencil by hand, at other times they were cut out in white paper with a pair of scissors, the white paper being afterwards placed on a piece of black; but as those artists who were willing to practise in this department were not always good draughtsmen, several instruments have been invented and mechanical means resorted to, to obtain a correct outline with facility.

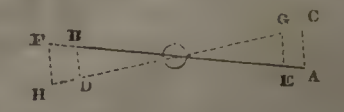
At first the shadow of the head was received on a screen, and the outline traced of the natural size, this outline being afterwards reduced with the assistance of a pentagraph; then the pentagraph by a peculiar arrangement was enabled to effect the same object by one effort; this is the most expensive, but, at the same time, the most correct instrument for taking profiles.

The Profile Machine we are about to describe, is the simplest in its construction, and that in most common use; its principle is correct, but in practice it is liable to error. A is a long rod jointed for the convenience of being easily taken to pieces; it passes through a solid ball seen in the upright frame in which it is fixed, and can be adjusted so as to make the comparative lengths on each side this ball whatever may be required. The ball through which the rod passes works upon a universal joint called the



ball and socket, which allows it free motion in all directions, upwards, downwards, or sideways. The point of the short end of the rod is formed of steel, sufficiently sharp, when gently pressed against a piece of card-board, to make a slight but a visible mark; this point is pressed upon by a piece of heavy wood, loaded at the back with lead, and swinging like a side-board in the frame B. The whole is firmly fixed on a table. To prevent the weight of the longer arm of the rod overbalancing the shorter, a piece of silk which is fastened to the long end goes over two pulleys in the ceiling, having a counterbalancing weight attached to it at B. The sitter is placed in a chair with arms, and having a pad attached to it to rest the head against; to prevent its shifting, this pad slides up and down so as to be capable of adjustment to the height of the party in the chair. A piece of card-board of the requisite size is placed in a kind of frame in the board at B, and pressed by its weight against the short end of the rod; everything being arranged, the profilist takes in his hand the long end of the rod, and passes it slowly and steadily along the features of the sitter, taking care not to press upon the soft parts, such as the lips. It is best to begin at the back of the shoulders, and move the rod carefully over the head and down the front of the face. While the profilist is guiding the long end of the rod in this manner, the point at the short end is making a reduced outline on the card on the board. The smaller, in proportion to the size of life, the reduced head is intended to be, the shorter the short end of the rod ought to be, in relation to the long end.

The following diagram will explain the reason of this:—Suppose A B to represent the rod, and the ball through which it passes; if it moves upon its centre so that A shall traverse as far as C, it is evident that



the short end B will be moved as far as D: so that if A, in moving from A to C, shall have passed over so much of the face as lies between the forehead and the chin, in the same manner B, in being moved as far as D, will have marked the same features on the card-board on a reduced scale. But if the rod had been moved through the ball so that A should have been at E, and B at F, then if the long end moved from E to G, the shorter arm would be moved from F to H, and the difference between the natural size of the profile and the reduced copy would not be so great, for there is not so much difference between E G and F H as there was between A C and B D.

The outline of the profile being marked on the card by the point at B, has to be filled up with lamp-black, ground in a weak solution of glue, sufficient to bind the colour, but not enough to give it a glossy surface.

THE velocity of the wind varies from nothing up to 100 miles in an hour; but the maximum is variously stated by different authors. According to Smeaton, a gentle breeze moves between four and five miles per hour, and has a force of about two ounces on a foot; a brisk pleasant gale moves from ten to fifteen miles, with a force of twelve ounces; a high wind, thirty to thirty-five miles, with a force of five or six pounds; a hurricane, beating along trees, houses, &c., has a velocity of one hundred miles, and a force of forty-nine pounds on the square foot.—?

LET no company or respect ever draw you to excess in drink, for be you well assured, that if ever that possess you, you are instantly drunk to all the respects your friends will otherwise pay you, and shall by unequal staggering paces go to your grave with confusion of face, as well in them that love you, as in yourself: and therefore abhor all company that might entice you that way.—LORD STRAFFORD.

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THE WYE AND MONMOUTHSHIRE. No. V

NEW WEIR, ON THE WYE.

Lives there a man, so lost to Nature's charms,
That would not shun, when scenes like these invite,
The crowded city—and, with joyous step,
Through fair Siluria trace his devious way!
There rosy health dwells in the mountain breeze,
And plenty in the vale. The greenwood dell
Teems with luxuriance, and the river's marge
(As swift from moorland-steeps the waters flash),
With views romantic greets the enraptured eye.

WHITCHURCH—GREAT AND LITTLE DOWARD—NEW WEIR—MONMOUTH.

In resuming our account of the "Wye Tour," we will begin by noticing those singular oval tub-shaped skiffs, used by the fishermen on the Wye, below New Weir, and some other Welch rivers, called "coracles," pronounced *truckles*, or *cruckles*, by these primitive sportsmen, "the remains, perhaps, of the ancient British navigation, which the least motion will overset, and the slightest touch may destroy." These tiny boats are so light, being constructed of canvass or hide, well pitched and stretched over a slender frame-work of wood, that the fishermen carry them on their backs from one part of the river to another.

The scenery around the sweetly-retired village of WHITCHURCH is pleasing; and the Great and Little Doward hills, which bear the name of King Arthur's Plain, (the latter an eminence of peculiarly fine outline,) boldly rise in the background with a remarkable effect. Upon the summits of both these hills are interesting remains of ancient British hill-forts. The western, or most accessible side of the Great Doward, is strongly fortified by entrenchments. Three circular terraces wind up to the summit of the Little Doward, which is supposed to have been defended by Caractacus in his war with the Romans. In a valley between the hills is a romantic cavern, called "King Arthur's Hall," evidently nothing more than the level of a worn-out iron mine.

After leaving Cymon's Yatt, and on our approach to NEW WEIR, which Gilpin terms "the second grand scene on the Wye," the view consists of exquisite crags, thrown into fine confusion by falls from the upper rim. These crags are full of projections and recesses, and heaps of ruin, all shrubbed and weather-holed, and present a most romantic variety of shelves, rude arches, clefts, and mimic towers. Between these and the opposite bank of rock-wall and hanging wood, the river, rapid and confined, roars hastily along. In front are rich wooded eminences, rising above or lapping over each other. Along the banks is a series of meadows, of deep rich green, just enlivening the dusky solemn gloom of the narrow dell. A single rock-column gives an

agreeable variety to the side crags. It is only one of several others similar, which were standing many years ago, insulated from the main wall of rock, which have either fallen, or, more probably, have been destroyed by the remorseless lime-burners, who, regardless of the beauties of the Wye, are ever employed in supplying the ravenous lime-kiln, which "in grim repose expects its evening prey." The rock-pillar above alluded to, is said to have been denominated *Bear Croft*, from an eminent barrister, who used to attend the assizes at Monmouth.

The scenery at New Weir is really magnificent:—lofty masses of rock on both sides of the river, (which is wider than usual in this part,) rise almost perpendicularly from the water, clothed with an infinite variety of fine grown trees and pendant shrubs; the pale subdued colouring of the limestone crags finely harmonizing with the rich and ever-varying tints of the foliage, which in the autumn especially has a singularly exquisite effect. New Weir, which was constructed for catching salmon, was removed some years ago, but the site of the Weir is marked by the impetuosity of the stream, which tumbles and roars amid large masses of rock in its channel, that have either been hurled by the violence of tempests from the heights above, or swept down by the sudden irruption of a winter's flood. An iron forge, emitting clouds of smoke and sullen sounds, formerly stood here, and jarred with the associations of the scene; but it is now a dilapidated ruin, and nothing disturbs the deep tranquillity but the noise of the waters, and the sighing of the wind among the branches of the trees. We agree with Roscoe that "to view the scene to the best advantage, the tourist should descend from the summit of Cymon's Yatt, by the winding road traversed by the mules which brought coal from the forest when the works were used."

Below New Weir, scenery of the same character continues to arrest the attention. The river here makes a curve, and the voyager floats swiftly past High Meadow Woods on the left, and the precipitous rocky eminence of the Great Doward on the right. At the end of this reach, a mass of rock covered with shrubs and parasitical plants presents itself, the river in front forming a pool, backed by the wild purple summit of the Little Doward. A finer scene from the water it is almost impossible to conceive. Further down, a detached cluster of rocks, called the "Three Sisters," skirt the shore, near which in a short reach, there is a pool called Martin's, supposed to be nearly seventy feet deep; a greater depth than in any other part of the river. At the extremity of the reach from King Arthur's Vale, the castellated form which the Great Doward assumes at this point, again presents itself to view. The Leys House, the residence of Mr. Blakemore, M. P. for Wells, at the foot of the Little Doward, on the right, with a woody amphitheatre in front, terminates the scene. The river, after passing this turn, gently meanders through a pleasant valley, "midst fields and pastures green, in flat, swell, and hollow," and leaving the solitary church of Dixton on the right, at last reaches "delightsome"

MONMOUTH, which is finely situated at the termination of a gently undulating valley surrounded by lofty wooded hills, and nearly encircled by the rivers Wye and Monnow, the latter uniting with her "peerless" sister a short distance below the town.

The British name of Monmouth was *Monywy*, evidently derived from its peninsular situation on the rivers Mon and Wye. The present English name is obvious—the mouth of the Mon or Monnow. It is supposed by Horsley and other eminent antiquaries, to be the site of the station *Blestium* of Antoninus; Camden, however, places that station at Old Castle, or Longtown, a small sequestered village on the banks of the Monnow, about three miles distant from Llanthony Abbey, where there are some remains of a very ancient fortress. In corroboration of this opinion, it may be observed that no vestiges of the Romans, with the exception of some coins, have been discovered either on the site, or in the immediate vicinity of Monmouth. The town was fortified at a very early period, and was surrounded by walls and a moat, only small portions of which are now visible. Of the four gates, the ancient gate-house called the Monnow Gate, is the only one which remains entire; and is remarkable not only from its primitive style of construction, but from its position in the centre of a bridge. The remains of the castle, once an important edifice, situated on the ridge of an eminence on the north bank of the Monnow, chiefly consist of a ruined tower. In front of the Town Hall, which stands in Agincourt-square, is a statue of Henry the Fifth, who was born at Monmouth on the 9th of August, 1387. The magnificent and graceful spire of the parish church of the blessed St. Mary, which rises to a height of 200 feet, distinguishes Monmouth as much as the "Heaven-directed spire" of Ross. It is the only relic of the ancient priory church, and contains a fine peal of eight bells, which were brought from Calais by Henry the Fifth, who seems to have taken much interest in his birth place. The tourist ought not, therefore, to omit a visit to the steeple; and he will be further rewarded by a view of great beauty from the parapet. The body of the ancient church was pulled down and rebuilt in 1740, in a style, we are sorry to say, utterly at variance with the design of the original structure. The organ is, perhaps, not surpassed in tone by any other in the kingdom, nor is the service of our venerable church anywhere more admirably conducted. The remains of the priory, which was founded in the reign of Henry the First, by Wyhenoe de Monmouth, for Benedictine monks, although small, are of considerable interest. A richly ornamented projecting window is pointed out, (on doubtful authority,) as that of the library of Geoffrey of Monmouth, the celebrated historian, who was created Bishop of St. Asaph in 1152, but afterwards became Abbot of Abingdon, where he died. He translated a history of Britain from the British, which presents very dubious pretensions to veracity. The church of St. Thomas, called "Over Monnow," is of great antiquity, and has one of the finest recessed doorways with zigzag mouldings, that we remember. It will well repay inspection. The general style of the building is early Norman, but some parts are said to be British. The principal street of Monmouth is broad and well built; and the town altogether is a very neat and pleasing one, and groups with a striking effect from every point of view. There are two excellent inns,—the Beaufort Arms, and King's Head. A very extensive new market is now in progress in a fine situation above the lofty bank of the Monnow. Although the county town, we are not aware that it possesses any species of manufacture deserving of mention. In the old time it was celebrated for its *caps*, which are wittily spoken of by Shakspeare in his play of Henry the Fifth. It is said that this trade was removed to Bewdley, in Worcestershire, in consequence of a great pestilence which swept away the inhabitants. The county goal by the side of the Monnow, near the extremity of the town, is a compact castellated building, erected at the end of last century, on Mr. Howard's plan.

PRINCIPLES OF CLEANLINESS IN NATURE.

Neatness or cleanliness of creation is one of the most striking provisions in nature, as it is also one which seems to have been nearly overlooked by naturalists, or viewed as if it was confined to a few animals. It will be seen, on the contrary, that it is one of the Creator's leading designs, and that careful provisions have been made for it both in the animal and vegetable department of life.

The contrivance for this purpose in plants, consists in the nature of the surfaces, most remarkable in the leaves, where this object is sometimes attained by a high polish and great density, at others by a waxy secretion, at others again, by a minute texture of the surface, resembling that of hairs and feathers, or by means of actual down or hairs; as, in the flowers, the globular velvety surface, which enhances the colours by dispersive reflection, serves for this end also. These prevent the lodgment of water, which is itself injurious, and, with that, of all liquid matters which might soil them; while the dust which might have adhered in a dry state, is easily dislodged by the first shower. How effectual the provisions are, is evident; since a dirty plant (to use an expressive term) is scarcely ever seen, peculiarly exposed as they are to the adhesion of soil: and thus does the vegetable world present that universal look of cleanliness and neatness, which is as striking as if there was a hand perpetually employed in no other office; preserving an order that we cannot maintain in our possessions, without constant labour. If all the dead portions, in leaves and flowers, with little exception, detach themselves, the effect is the same, and so, perhaps, was the purpose; while we know how disagreeable the appearance is, when, by housing them, we here interfere with the proceedings of nature. But if we overlook the contrivance as well as the intention, considering the effect, like all else, as a matter of course, so do we also, not merely forget to note another provision for maintaining the neatness of the vegetable creation, but neglect the very fact itself, as if this also could not be otherwise. Yet the least reflection will show that the result would be incredible but for experience. The simple power of vitality, maintaining the circulation, is not only sufficient to retain the feeble petal in its place against the power of the storm, but to maintain all the most delicate and tender flowers in perfect shape, rigidity, and order, during the time that they were ordained to last. We cannot imitate these objects, without much stronger materials, and ligatures, and gums; yet the cistus, with its almost cobweb petals of a few hours, is a structure of perfect strength, retaining the elegant form assigned to it, till the term of its life has arrived.

The same cleanliness, with the same decided intention to produce it, pervades the animal creation, and under many more forms than it is convenient or proper to notice. To man, it has been permitted to do what he pleases; and he is not slow in disobeying the universal command, which the other animals have received through instincts for this purpose, and through provisions for rendering neatness attainable by them: as thus also has he contrived to make some of his followers what he too often is himself. And if we forget to note this also, we should certainly have found it a very difficult problem, to devise the means of keeping all this multitudinous world of animals in that state of neatness, in which we find it some difficulty to preserve ourselves, peculiarly exposed as they are to soil. Yet a dirty animal, like a dirty plant, is scarcely to be found: the very mole and the earthworm, inhabiting the soil itself, are without a stain; the snail is clean notwithstanding its adhesive surface; the purity of the swan, in the midst of the mud, is almost proverbial. In the birds, indeed, we see a necessity for neatness, while we find the instincts as strong as the provisions are perfect. But in the terrestrial animals, there is no utility, nor does any inconvenience arise from the reverse; whence we must conclude, that the Creator's intention was simply neatness, order, cleanliness; a virtue to which we are willing to give a place, in words at least, among the minor ones, as we term them.

In these, and in the birds, the essential provision is similar to that in plants, consisting in the structure and superficial texture of hair and feathers. Popular prejudices term these animal substances less cleanly than vegetable ones; the facts are the direct reverse, as common experience in our own clothing should show. They do not absorb water, and, like plants, they repel the adhesion of what is dry. Thus do the quadrupeds keep themselves clean with very little effort, as the birds do, under that preening which they have been commanded to delight in. In insects the provisions are much more striking. The most naked larvæ are always clean, like the earthworms, inhabit where they may. In others a peculiar texture of the surface, like that of hair, produces the same effects; and thus do we find down, or hairs, as in the bee, the butterfly, and the caterpillars, preventing all adhesion of the several substances to which they are exposed; but, as if to satisfy us of the Creator's decided intention on this subject, we find some of these animals provided with the very utensils of cleanliness which we construct for ourselves; furnished with brushes, together with that attached instinct of neatness which we daily see in use in the house-fly, while it would be easy to add much more to the same purpose from the records of natural history.

There is yet more provided for the same end, if in a very different manner, though in these cases, seeing that provision is made for the salubrity of the atmosphere and the waters, and for the feeding of animals, we easily overlook the second, if not secondary purpose. Dead fishes are rendered luminous, that they may be discovered and consumed before they become offensive. On the land, the consumption of carcasses is provided for by the instincts given to several beasts and birds of prey, and, beyond all, by the appointment of the different larvæ, which are destined to this food; while, to make that expedient availing, such is the produce, and such the rapidity of growth, as to have made naturalists remark, that the progeny of three or four flies is sufficient to consume a horse. And assuredly, for the same end, has there been implanted in almost every animal that instinct, through which they seek concealment when about to die; while how effectual this is we know, since with, I believe, the sole exception of the shrew mouse often choosing a gravel walk for this purpose, we scarcely ever meet the dead body of a wild animal.

[Macculloch's *Proofs and Illustrations of the Attributes of God.*]

He that enlarges his curiosity after the works of nature, demonstrably multiplies the inlets to happiness; therefore we should cherish ardour in the pursuit of useful knowledge, and remember that a blighted spring makes a barren year, and that the vernal flowers, however beautiful and gay, are only intended by nature as preparatives to autumnal fruits. —Johnson.

It is a shame for a man to desire honour because of his noble progenitors, and not to deserve it by his own virtue —St. Chrysostom.

ILLUSTRATIONS OF THE BIBLE FROM THE MONUMENTS OF ANTIQUITY. No. XIX.

ALTARS ON HIGH PLACES.

ALTARS.

ALTARS, or special places for offering sacrifices to the Deity, and, after corruption spread over the earth, to the false gods of the heathen, were used from the most remote antiquity. Cain and Abel erected altars when they presented the first sacrifices of which we have any record after the Fall, and Noah's first care was to build an altar after the deluge had subsided. Altars, therefore, were used before temples were erected; they were built sometimes in groves, sometimes on the highways, and sometimes upon the tops of mountains. The most ancient form of idolatry was elementary, that is, the object of worship was some power or principle of nature,—the sun, the earth, the powers of production and destruction. With such a form of worship notions of gloomy sublimity were associated, and hence the dark recesses of groves and the sterile tops of lofty mountains, were chosen for the altars of the oldest nations. So prevalent was the custom, that the phrase "worshipping on high places," is frequently used to signify idolatry in the Old Testament, and we find that the early Persians in the East, and the Druids of England and Ireland in the West, were equally remarkable for erecting their altars in groves and mountains. The worshipping on high places was strictly forbidden to the Jews; not merely because the custom had a tendency to produce idolatry, but also, because the elementary form of idolatry was the worst, the most cruel, and the most debasing. It was before these altars in groves and mountains, that human sacrifices were most frequently offered, that parents whose natural affections were blighted and destroyed by dark superstitions, made their children pass through the fire to Moloch; and it was in such places that licentiousness and depravity were systematically made a part of public worship.

The idolatry into which the Jews so frequently lapsed while they were governed by judges, was a compound of cruelty and lust, and hence the severe visitations to which they were exposed by the righteous indignation of Jehovah. It does not appear from the monuments, that "altars on high places" were common in Egypt, though there are some traces of worship in groves; but among the Canaanites and the heathen nations surrounding Palestine, this abominable form of idolatry prevailed, and its tendency to gratify the worst passions of man's nature, too frequently led the chosen people of God to forsake his pure and simple worship, to throw off their allegiance to their Almighty benefactor, and to sink themselves below the level of the beasts of the field.

But this form of idolatry was not only condemned by Holy Writ, it was prohibited by the most enlightened of the heathen themselves; for we find, in Grecian history, that the introduction of the worship of Bacchus into Europe was strenuously resisted by several monarchs of Thrace, Thessaly, and Thebes; and that the Bacchanalian rites were watched with anxious jealousy by the statesmen of the Grecian republics. The Bacchanalian howlings, revelries, and debaucheries, practised on the tops of mountains, were clearly borrowed from the Asiatic worship on high places; indeed, all the legends respecting Bacchus are so decidedly Oriental and even Indian in their character, that the Asiatic origin of the worship cannot be doubted for a moment. As civilization advanced in Greece, the Bacchanalian rites were discouraged, but an attempt was made to introduce them into Italy, where they produced so much licentiousness and depravity, that the Roman Senate forbade them to be practised under pain of death. The strict rules prescribed for the construction of the altars which the Israelites were to use, afford a remarkable proof of the Divine inspiration of the Pentateuch, because several of those rules were designed not only to guard against the corruptions of the Egyptians, with which we may suppose Moses to have been acquainted, but in a still greater degree to prevent them from adopting the abominations of the Canaanites, into whose land Moses had never entered.

Altars were at first made only of turf, but they were afterwards made of marble, of wood, and even

of horns, like that of Apollo at Delos. The altars used by the patriarchs were of stone, and were generally of rude construction; thus, the altar which Jacob set up at Bethel, was simply the stone which had served him for a pillow, and the altar of Gideon was a stone before his house. Although little credit is due to the Arabian tradition that Abraham visited Mecca, and erected there an altar to the true God, there can be no reasonable doubt that the religion which Ishmael established among his descendants was purely patriarchal; and therefore, the Kaaba, or sacred stone, so enthusiastically venerated by Mussulmans, and which was regarded as holy long before the age of Mohammed, might have been the primitive altar established by the founder of the Arab race. The traditions respecting the Kaaba are probably mixed with the legends respecting an altar erected by Adam, which we find in the Jewish Talmud, and among the early fathers of the Christian church in Syria. They also speak of an altar erected by Enoch, which they believe to have escaped from the devastation of the deluge; and though such traditions have no foundation in fact, they are valuable so far as they illustrate what we so frequently find in Scripture, the veneration shown to places where altars were erected.

This is particularly remarkable in the history of Jacob; the place on which he laid himself down to sleep had no peculiar mark or sanctity; the stone which he chose for his pillow was probably a block that, but for subsequent events, would have remained undistinguished for ever; but when he erected it as an altar, and consecrated it with oil, the stone became sacred for all who passed near it, and the place where it was raised continued to be called Bethel, or the house of God, through a long series of ages. Jacob found, it would appear, that the altar remained in its place when he was returning back to Canaan, after so many years servitude under Laban; and there is reason to believe that it had not been removed during the centuries that elapsed between that event and the conquest of Canaan by Joshua. The undoubted preservation of the Kaaba, notwithstanding the conquest of Mecca by the Karmatians, and the Jewish legends respecting the altars of Adam and of Enoch, are sufficient to explain the long preservation of Jacob's altar at Bethel, which might otherwise appear unaccountable.

The shape of altars varied in different ages and countries; they were probably at first of a square or rectangular form, sometimes rude, and sometimes fashioned with great care. Most of the ancient Greek altars were of a cubical form; and hence, when the oracle of Apollo commanded that a new altar should be prepared exactly double the size of that which already stood in the temple, a problem was given surpassing the powers of science in those days, which is well known to mathematicians under the name of "the duplication of the cube."

In the illustration at the head of this article, it will be seen that the mountain-altars were generally made of rough stones, and this is especially remarkable in the Druidical structures preserved in various parts of Britain; but when temples began to be erected and decorated with all the beauty of architecture, ornaments were added to the altars; and, as in the engraving on the next page, they were sculptured with some scene from the fabulous history of the gods, or some emblem of the deity to whom they were dedicated. Were such a custom sanctioned among the Jews, their reverence for the emblem would soon have degenerated into idolatry, as in the case of the brazen serpent which Hezekiah caused to be destroyed, on account of its having become an object of superstitious veneration. God therefore strictly prohibited any carvings on the altar.

ROMAN ALTAR AND SACRIFICE.

An altar of earth thou shalt make unto me, and shalt sacrifice thereon thy burnt offerings, and thy peace offerings, thy sheep, and thine oxen: in all places where I record my name I will come unto thee, and I will bless thee. And if thou wilt make me an altar of stone, thou shalt not build it of hewn stone: for if thou lift up thy tool upon it, thou hast polluted it. (Exod. xx. 24, 25.)

Solomon appears to have enclosed the altar of unhewn stones in a grating of brass, which he overlaid with gold; and this custom was followed in the building of the second temple after the return of the Jews from the Babylonish captivity. In consequence of the superior value of the covering of the altar, we find that the ignorant and superstitious Jews in our Saviour's time reverenced it more highly than the altar itself, and this is one of the many instances of their homage to external appearances for which they were reprehended by our blessed Redeemer.

Woe unto you, ye blind guides, which say, Whosoever shall swear by the temple, it is nothing; but whosoever shall swear by the gold of the temple, he is a debtor! Ye fools and blind: for whether is greater, the gold, or the temple that sanctifieth the gold? And, Whosoever shall swear by the altar, it is nothing; but whosoever sweareth by the gift that is upon it, he is guilty. Ye fools and blind: for whether is greater, the gift, or the altar that sanctifieth the gift? Whoso therefore shall swear by the altar, sweareth by it, and by all things thereon. And whoso shall swear by the temple, sweareth by it, and by him that dwelleth therein. (Matt. xxiii. 16—21.)

ALTAR MARKED WITH SYMBOLS.

The ease with which such an altar was prepared, elucidates another important part of Scripture,—the contest between Elijah, the single prophet of the Lord, and the four hundred and fifty prophets of Baal, in the reign of Ahab.

When the ten tribes of Israel separated from the kingdom of Judah, Jeroboam, in order to prevent the annual pilgrimage of his subjects to Jerusalem, erected two golden calves as national sanctuaries at Bethel and at Dan. He selected those places, not because they were the most convenient, but because they were already reverenced by his subjects. Bethel, as we have already said, was the place where Jacob erected an altar after his miraculous vision; and in Dan idolatry had commenced by setting up the idols stolen from Micah, not long after the death of Joshua. But all Israel did not follow the idolatry of its sovereigns; and the kings of the ten tribes erected fortresses on their frontiers to intercept the pilgrims going up to Jerusalem. In the reign of Ahab, the abominable rites of the Sidonian idolatry were introduced by Jezebel, a Sidonian princess, and she persecuted, or rather caused her weak and wicked husband to persecute all who refused to worship Baal, the national deity of the Sidonians. This iniquity was punished by a drought and famine, which endured several years; at length Elijah was sent to Ahab, and induced him to assemble all the prophets of Baal, on Mount Carmel, in the presence of the congregation of Israel.

And Elijah came unto all the people and said, How long halt ye between two opinions? if the Lord be God, follow him: but if Baal, then follow him. And the people answered him not a word. Then said Elijah unto the people, I, even I only, remain a prophet of the Lord; but Baal's prophets are four hundred and fifty men. Let them therefore give us two bullocks; and let them choose one bullock for themselves, and cut it in pieces, and lay it on wood, and put no fire under: and I will dress the other bullock, and lay it on wood, and put no fire under: and call ye on the name of your gods, and I will call on the name of the Lord: and the God that answereth by fire, let him be God. And all the people answered and said, it is well spoken. (1 Kings xviii. 21—24.)

The priests of Baal accepted this extraordinary challenge; they quickly erected an altar and prepared a sacrifice, but their summons to their idol for a manifestation of his power proved fruitless. "They called upon Baal from morning even until noon, but there was neither voice nor anything that regarded." Elijah waited until the time for offering the evening sacrifice had arrived; the altar required by the divine law was one which could easily be prepared; he Took twelve stones, according to the number of the tribes of the sons of Jacob, unto whom the word of the Lord came, saying, Israel shall be thy name: and with the stones he built an altar in the name of the Lord: and he made a trench about the altar, as great as would contain two measures of seed. (1 Kings xviii. 31, 32.)

The stupendous miracle by which Jehovah proved to the people that he was the Lord of heaven above and the earth beneath, is sufficiently known. But it deserves to be remarked that the simplicity of the worship ordained by the true God greatly enhanced this triumph; for Elijah in this contest stood alone, and had not the altar been one which could be easily constructed by a single person, he would scarcely have been able to compete with the four hundred and fifty priests of Baal.

The reverence for altars was very great among the ancients; no greater insult could be offered to a conquered nation than to throw down its altars or pollute them, and hence Ezekiel dwells very forcibly on this circumstance, in his denunciation of divine vengeance against the idolatry of Israel:

Ye mountains of Israel, hear the word of the Lord God; thus saith the Lord God to the mountains, and to the hills, to the rivers, and to the vallies; behold, I, even I, will bring a sword upon you, and I will destroy your high places. And your altars shall be desolate, and your images shall be broken: and I will cast down your slain men before your idols. And I will lay the dead carcases of the children of Israel before their idols; and I will scatter your bones round about your altars. In all your dwelling places the cities shall be laid waste, and the high places shall be desolate; that your altars may be laid waste and made desolate, and your idols may be broken and cease, and your images may be cut down, and your works may be abolished. And the slain shall fall in the midst of you, and ye shall know that I am the Lord. (Ezek. vi. 3—7.)

This feeling was common also to European nations, and hence the motto "*Pro aris et focis*," that is, "for altars and firesides," was assumed when a nation was engaged in defensive war for the protection of religious worship and family comforts; that is, all which man holds dear to him. The phrase was first used by the Romans, whose veneration for their altars appears, from the monuments at Herculaneum and Pompeii, to have been equal to that of any nation of antiquity. The engraving in the preceding page illustrates not only the Roman altar, but the account we gave of sacrifices in our former article on this subject.

THE VIOLIN.

No. II.

On the Construction of the Violin.

The reader is of course aware of the construction of the modern Violin. A curious and somewhat fantastically shaped box, with a handle springing from one end, is the first object that strikes our attention. Four strings are tightly stretched by attachments at each end, which strings rest upon a bridge placed near their upper terminations. The strings are vibrated by means of a bow, which vibrations are communicated along the bridge to the upper table of the instrument,—then to the mass of air within the box, and again to the lower table by means of a sounding post, the ends of which touch both tables. This post is called by the French, *l'ame du Violon*, or, the soul of the Violin. The vibrations of the enclosed air are further assisted by a bar of wood enclosed within the box, and passing in the direction of its length, called *the bar of harmony*. Two apertures are made in the upper table of the instrument, of the form of an italian *S*, whereby the vibrations are more freely communicated to the enclosed air. The bridge is curved, in order to allow the bow to touch either of the middle strings separately, and a hollow on each side of the case, externally, allows a freer motion to the bow while playing upon the two other strings.

The strings are attached at the lower end to pegs in the handle of the instrument, by turning of which the strings are stretched more or less tightly, and thus the instrument is tuned.

A really good Violin on this construction is a costly instrument. A good-toned Violin cannot be bought in England or France for less than fifty guineas, and many have been sold for 250 guineas. An instrument made by Stradivarius can always be sold for 100 guineas. The choice, too, of a Violin is difficult: none but a master can determine its real value. It is said that new instruments are never good; for if they have a tolerable tone at first, it will soon deteriorate. The best Violins become so by beginning with poor and insufficient tones, and gradually improving. The Violin is a slow pupil, for it does not "discourse eloquent music" under fifty years' hard practice; but it then becomes invaluable.

The most memorable Violin-makers are the Amatis of Cremona; Andreas, Jerome and Anthony Amati, and Nicolas, the son of Anthony: the latter flourished about the year 1600. This family certainly constructed the finest violins in the world, and it is supposed that the elder Amati discovered some secret connected with their successful construction, transmitted it to his sons, and that it died with Nicolas, the younger branch of the family. Their Violins are distinguished by elegance of shape, sweetness and roundness of tone.

Stradivarius, the elder and the younger, were also of Cremona. The latter was flourishing in 1700. He inscribed on his Violins the following signature,—

Antonius Stradivarius Cremonensis faciebat, Anno A. S.

It is remarkable, also, that Cremona produced the celebrated Guarnerius. His inscription is,—

Andreas Guarnerius, fecit Cremonæ, Substinto, Sanctæ Teresæ, 1630.

Stainer, a native of Tyrol, constructed Violins remarkable for their full and piercing tone, such as has never been equalled. His inscription is,—

Jacobus Stainer, in Absom prope Œnipontum, 1647.

Albani, also a native of Tyrol, is another celebrated maker: and here we close the list, for the above are the names of the only makers that have descended to posterity as men who accomplished what none else had done or could do,—the only element perhaps in human fame. Many a violin of these makers has been spoiled in the vain attempt to discover the secret of its workmanship; expert artists have taken them to pieces, have constructed numberless instruments with the most scrupulous attention to their model, and the failure has been, in all cases, entire. New constructions have been attempted, and scientific models founded on the known principles of sound, and yet the superiority of the Cremonese artists still remains unquestioned.

But the most valuable contribution to our knowledge of the construction of the Violin, is the experimental instrument of M. Savart. A full description of this instrument is to be found in the *Manual of Natural Philosophy*, by Mr. Tomlinson, who, we believe, was the first to lay all the details of M. Savart's Violin before English readers. We owe the following account to Mr. Tomlinson's description, as also to the report of the Royal Academy of Sciences of Paris, on the merits of the new instrument.

M. Savart began his inquiry by endeavouring to distinguish the essential parts of the Violin from its empirical or ornamental details. He soon concluded that the vaulted form of the face and back is not a necessary part of its structure; he therefore constructed his Violin with flat surfaces, each formed of two pieces, $2\frac{3}{4}$ lines thick at one edge, and gradually tapering towards the other edge, which was 1 line thick: the thicker edges of each pair of tablets were then joined together. He next determined that the sides of the Violin ought not to be fancifully curved, but straight, in order that they might enter into undisturbed vibration from corner to corner of the instrument, and thus contribute to augment the sound. All the wood thus employed was cut and arranged in the direction of the fibres, or *longitudinally*, as it is called. The form of the instrument was that of a trapezoid, or four-sided figure, of which the lower breadth was less than that of the upper. In common Violins, the bar of harmony and the sounding-post are placed one on one side, and the other on the other side of the central line or axis of the instrument: Savart placed the bar of harmony along the central line, and thus equalized the vibratory action of both sides.

The sounding-post has usually been considered as a kind of support to the upper surface, but Savart found that its important office is to communicate the vibrations from the face to the back of the instrument, and the point at which he fixed the post in his Violin was such as to convey the sonorous vibrations more perfectly and energetically from the face to the back of the instrument.

The incisions made on the face of the instrument were next attended to. Savart covered these two openings with paper, and found the sound to be materially injured, because the enclosed air had no direct communication with the external air. He made the openings in the form of a parallelogram, that is, the edges to be straight and parallel, so that the fibres and the long margins of the holes were in the same direction, and the vibrations of the wood at those parts were rendered more symmetrical, while at the same time fewer fibres were cut than is the case with the form of the apertures usually adopted.

Before Savart mounted the various parts of his Violin, he took care that each part should perform its vibrations in a system similar to that of all the rest. He imagines that the celebrated makers before named, were aware of the importance of this principle.

The Violin of Savart was soon put to a severe test. A committee was appointed to examine and report on its merits. In this committee we find the distinguished names of Biot, Prony, Haüy, Charles, together with Cherubini the composer. The report of this committee is highly favourable. The new Violin was played by Lefebvre, the celebrated Parisian violinist, alternately with a Stradivarius; and the committee could not detect any difference between the tones of the old and the new instruments, when they were played alternately in an adjoining apartment, except by a little more sweetness in the tones of the new one.

On this subject Mr. Tomlinson offers a remark in which we cordially join:—

This was probably the first attempt to reduce fiddle-making to scientific principles; and the success which attended it ought to encourage similar efforts. Savart made many violins such as we have described, which had no pretensions to elegance or high finish, but all possessing the desirable qualities which we are in the habit of attributing to the "good old" Violins. Should any of our readers be of a mechanical turn, they might construct good Violins at the cost of a few shillings, by attention to the main points of difference between the common instruments and those above described,—all of which were made by Savart's own hands.

The best harps and pianos are made in England: the best violins can now be said to be made nowhere. Savart's Violin was made several years ago; but it has never become popular, or even known in France, where we should suppose it would soon flourish like a plant in its native soil: but in England the instrument has yet to be introduced, and we venture to hope that Mr. Tomlinson's description, and the present article, will tend to bring about so desirable an effect.

HYMN IN HARVEST TIME.

'Neath summer's bright and glorious sky,
While proudly waves the golden grain,
And through the falling fields of rye,
Comes on the joyous reaper train—
While nature smiles, and hill and plain
Are tranquil as the sleeping sea,
And peace and plenty brightly reign
By homestead, hearth, and forest tree.
God of the seasons, unto thee we raise
Our hands and hearts in melody and praise.

There is a sweet breath from the hills,
The incense from the mountain air,
Which from a thousand flowers distils
Its odours delicate and rare—
We feel its balm—we see it there
Among the bending wheat-blades move,
Kissing their tops in dalliance fair,
As if its very life were love.
God of the harvest, whence its breezes blow,
Receive the humble thanks thy creatures owe.

Our loaded wain comes winding home,
Then let us rest beneath the shade
Of this old oak, our verdant dome,
And watch the evening shadows fade—
O'er mount and meadow, lawn and glade,
They spread their deep'ning tints of gray,
Till all the scene their hues pervade,
And twilight glories melt away.
God of the world, who round thy curtain throws,
Thanks for the time of quiet and repose.

How still is nature all around!
No song is sung, no voice is heard—
Save here and there a murmuring sound,
As if some restless sleeper stirred;
The grasshopper, night's clam'rous bird,
Chirps gay, but all is hush beside—
And silence is the soothing word,
Whose spell diffuses far and wide.
God of the universe, by night and day,
We bless Thee for the gifts we ne'er can pay.

Thompson.

THE ADVICE OF A PHILOSOPHER.

Take especial care that thou delight not in wine, for there never was any man that came to honour or preferment that loved it; for it transformeth a man into a beast, decayeth health, poisoneth the breath, destroyeth natural heat, brings a man's stomach to an artificial heat, deformeth the face, rotteth the teeth, and to conclude, maketh a man contemptible, soon old, and despised of all wise and worthy men; hated in thy servants, in thyself and companions; for it is a bewitching and infectious vice. A drunkard will never shake off the delight of beastliness; for the longer it possesses a man, the more he will delight in it, and the older he groweth, the more he will be subject to it; for it dulleth the spirits and destroyeth the body, as ivy doth the old tree; or as the worm that engendereth in the kernel of the nut.

Take heed, therefore, that such a cureless canker pass not thy youth, nor such a beastly infection thy old age; for then shall all thy life be but as the life of a beast, and after thy death, thou shalt only leave a shameful infamy to thy posterity, who shall study to forget that such a one was their father. Anacharsis saith, the first draught serveth for health, the second for pleasure, the third for shame, the fourth for madness; but in youth there is not so much as one draught permitted; for it putteth fire to fire; and therefore except thou desire to hasten thine end, take this for a general rule, that thou never add any artificial heat to thy body, by wine or spice, until thou find that time hath decayed thy natural heat, and the sooner thou beginnest to help nature, the sooner she will forsake thee, and trust altogether to art. Who have misfortunes, saith Solomon, who have sorrow and grief, who have trouble without fighting, stripes without cause, and faintness of eyes? even they that sit at wine, and strain themselves to empty cups. Pliny saith, wine maketh the hand quivering, the eyes watery, the night unquiet, a stinking breath in the morning, and an utter forgetfulness of all things.

Whoso loveth wine, shall not be trusted of any man, for he cannot keep a secret. Wine maketh man not only a beast, but a madman; and if thou love it, thy own wife, thy children, and thy friends will despise thee. In drink, men care not what they say, what offence they give, forget comeliness, commit disorders; and to conclude, offend all virtuous and honest company, and God most of all, to whom we daily pray for health, and a life free from pain; and yet by drunkenness and gluttony, (which is the drunkenness of feeding) we draw on, saith Hesiod, a swift, hasty, untimely, cruel, and an infamous old age. And St. Augustine describeth drunkenness in this manner:—"Drunkenness is a flattering devil, a sweet poison, a pleasant sin, which whosoever hath, hath not himself, which whosoever doth commit, doth not commit sin, but he himself is wholly sin."

Innocentius saith,—"What is filthier than a drunken man, to whom there is stink in the mouth, trembling in the body; which uttereth foolish things, and revealeth secret things; whose mind is alienate and face transformed? There is no secresy where drunkenness rules; nay, what other mischief doth it not design? whom have not plentiful cups made eloquent and talking?"

When Diogenes saw a house to be sold, whereof the owner was given to drink, "I thought at the last," quoth Diogenes, "he would vomit a whole house."——Sir Walter Raleigh.

I cannot call riches better than the baggage of virtue; the Roman word is better, "impedimenta;" for as the baggage is to an army, so is riches to virtue; it cannot be spared nor left behind, but it hindereth the march; yea, and the care of it sometimes loseth or disturbeth the victory; of great riches there is no real use, except it be in the distribution: the rest is but conceit.——Bacon.

It is an old saying, *that charity begins at home;* but this is no reason it should not go abroad: a man should live with the world as a citizen of the world; he may have a preference for the particular quarter or square, or even alley in which he lives, but he should have a generous feeling for the welfare of the whole.——Cumberland.

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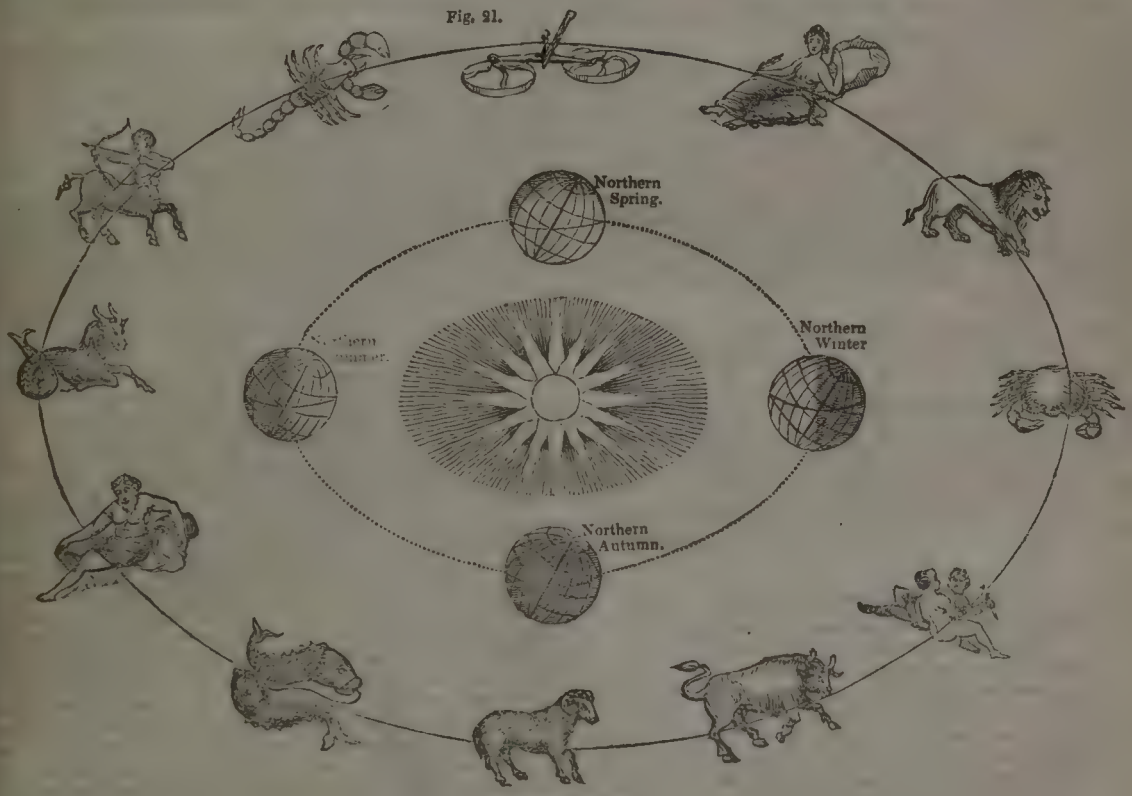
POPULAR ASTRONOMY. PART IV.

Fig. 21.



THE SEASONS.

Wished Spring returns; and from the hazy south,
While dim Aurora slowly moves before,
The welcome Sun, just verging up at first,
By small degrees extends the swelling curve!
Till seen at last for gay rejoicing months,
Still round and round, his spiral course he winds,
And as he nearly dips his flaming orb,
Wheels up again, and re-ascends the sky.

THE SEASONS.

THERE are but few phenomena presented to the notice of man more beautiful and, at the same time, more instructive to him, than the regular succession of Seasons, and the varied benefits which they confer. The cold and bleak temperature of our Winter is rendered less rigorous by the artificial processes by which we obtain warmth within our dwellings; but still the genial and refreshing air of Spring is looked forward to by all as a delightful change from the dreariness of Winter. The pleasing associations connected with Spring, when both animal and vegetable life seem to acquire new vigour, and a new lease, as it were, of existence, would not alone suffice for the wants, either natural or artificial, of man. The Summer's Sun is required to ripen and bring to perfection the fruits of the Earth, whether to be used directly by himself as articles of food, or to nourish those animals which subsequently furnish him with diet. The Summer's Sun is also necessary to melt the ice, which makes the polar regions one sterile and dreary waste, unfit alike for almost every species of animal or vegetable. Were it not that the genial warmth of the Summer's Sun dissolves large portions of ice, the frozen regions would gradually extend their boundary towards the equator; and those countries which are now called *temperate*, and which present fit localities for the habitations of man, would become ice-bound, and consequently uninhabitable.

But do our wants cease here? should we be content with constant Summer? No; the grass would become withered, the flocks would lose the food with which they were for a while nourished, the brooks and rivulets would be dried up, pestilential diseases would ensue from the putrefaction of animal and vegetable bodies, and man himself, enervated and debilitated by excess of heat, would droop as if the vivid spark of life were sinking out. These results are prevented by the wise ordinations of Providence, by which Summer is succeeded by Autumn; a season which at the same time softens the descent from Summer to Winter, and brings to perfection those fruits which are to serve for the good of man, and other animals, during the remaining portions of the year.

Thus, then, does each season bring with it its joys and advantages; and thus are we taught to admire the exquisite mechanism and adjustment of the heavenly bodies, by which these joys and advantages are imparted to us. But how are these seasons brought about? and why is it that the Sun sheds such a varying amount of cheering influence on the Earth at different seasons? The answer to this question is admirably calculated to show, what wonderful effects spring from apparently small causes. The reason for the succession of the various seasons is to be found in the simple circumstance, that the Earth does not revolve on her axis in the same plane in which she revolves round the Sun; if those two planes coincided, we should have no variety of seasons; the same intensity of heat or of cold would be experienced at the same place, at every season of the year. This important circumstance we now proceed to

explain, and to illustrate by reference to the diagram which forms the frontispiece of the present paper.

Before we enter upon that inquiry, however, it will be desirable to describe certain circles, which are supposed to be drawn on the surface of the Earth, and in doing so we must refer to the figure of the globe at the end of this article.

The Earth is, as before stated, nearly a perfect globe, of which the equatorial diameter is a little greater than the polar; and it has, likewise, been observed, that this globe, besides its revolution round the Sun in the course of a year, revolves on its own axis, from west to east, once in every twenty-four hours. The two ends of this axis are the north and south *poles*, P and Q. The circle which surrounds the Earth, exactly midway between the two poles, is called the *equator*, E R. Another line crossing the equator in an oblique direction but not given in the figure, is called the *ecliptic*, from the circumstance that whenever an eclipse occurs, either solar or lunar, the Sun, the Moon, and the Earth are all quite, or very nearly, in this plane. The ecliptic is a circle which, like the equator, goes round the Earth, and represents the apparent path of the Sun in the course of a year; that is, if a body were held exactly in a right line between the centre of the Sun and the centre of the Earth, the shadow of that body would travel along the ecliptic. These two circles, the equator and the ecliptic, are called *greater* circles, because their planes pass through the centre of the Earth, and divide the Earth into two *equal* parts; whereas, all other circles are denominated *less* circles, because their planes divide the Earth into two *unequal* parts. There are also two circles which surround the Earth, parallel to the equator, and at a distance from it equal to about 23½°. These are called *tropics*, from a Greek word which implies *turning*, as the Sun, when it has arrived at those parts, begins then to turn away again northward or southward, as the case may be; the circle which is nearer to the north pole being the tropic of Cancer, and that which is nearer to the south pole being the tropic of Capricorn. The position of these two circles is determined by the greatest distance which the ecliptic recedes from the equator; and they receive their name from the circumstance of the Sun being at the time in the constellation which gives the name to the tropic. There are also two small circles which surround the poles, at a distance from the poles exactly equal to the distance of the tropics from the equator. The *arctic* circle is that which surrounds the north pole, at a distance of 23½°; the *antarctic* circle is that which surrounds the south pole. The term *antarctic* signifies *opposite to the arctic*, which latter term is derived from the Greek for a *bear*: the little bear is a constellation over the north pole of the Earth.

We now turn more particularly to the subject of our frontispiece, where we observe an oval line, which the Earth describes annually about the Sun, or which the Sun appears to describe round the Earth. The Earth moves round this orbit in a year, and we have the position of the Earth in that orbit at four different periods of the year, about three months asunder. It will be seen that the axis of the Earth is inclined towards one side, and that it remains parallel throughout the whole of the Earth's revolution; that is, that there is exactly the same obliquity, or sloping direction, at all seasons of the year; this causes the equator to form with the ecliptic an angle of about 23½°.

Let us now suppose the time of the year to be the 21st of March, and let us trace the progress of the Earth in her annual orbit. She is then in the position which affords the northern Spring, and the Sun is at exactly the same distance from both poles; that is, if the centres of the Sun and the Earth were connected by a right line, this line would pass through the equator, and would therefore be equidistant from the two poles. Now it is not difficult to see that in this case the Sun imparts just as much heat to one pole as to the other, affecting either hemisphere alike. At about the 23rd of June the Earth is at the position denoted by *northern Summer*. Here we notice that the Earth is farther from the Sun than it was three months before: but the excess of heat at this latter period is due to a circumstance altogether separate from the actual distance of the Sun. The obliquity of the axis of the Earth is the important circumstance to which we have to keep our attention. We perceive that, in the northern Summer, the north pole is nearer to the Sun than the south pole: hence a greater amount of heat is received from the Sun by the northern part of the Earth than by the southern, at this period. This is the sole origin of the results of the seasons, *Summer* and *Winter*: the large amount of heat received by the northern hemisphere, in comparison with that received by the southern, produces the season of Summer to the former, and Winter to the latter. If at this season we mark the boundary line between the enlightened and the dark hemispheres of the Earth, it will be seen that this line will just graze the polar circles: it will likewise be seen that, if we draw a line through the centres of the Sun and Earth, that line will pass through the tropic of Cancer.

We next find the Earth in that position which she attains about the 21st of September, when the northern Autumn is felt. We observe that the Earth's position is such as it was in the Spring, when the two poles were exactly equidistant from the Sun. Here, then, we have the season of Autumn, in which the direct light and heat of the Sun are equal to what they are in Spring. This is not what we are in the habit of supposing, because the sensation of warmth is decidedly greater in Autumn than in Spring; but the apparent contradiction is thus accounted for: although the *direct* heat of the Sun is the same in Autumn as in Spring, on account of the distance of the Earth from the Sun being equal at those two periods, and the Sun's rays being received at the same degree of obliquity at any given spot,—yet the Autumn heat is increased by the accumulated heat of the Summer. The surface of the Earth receives in Summer so large a portion of heat, that a considerable time elapses before it can be radiated upwards into the air, and thus is formed a magazine of heat, by which the autumnal warmth of the Sun's direct rays is augmented; and hence we are furnished with the fructifying temperature so propitious for the time of harvest.

From the 21st of September, the Earth progresses towards the north-wintry position, which she attains about the 24th of December. Here we find a marked change in the relative position of the north and south poles: the north pole is turned away from the Sun, while the south pole inclines towards him. Hence the north pole and all the adjacent parts, including, in fact, the whole northern hemisphere, receive a much smaller share of the Sun's heat than is enjoyed by the southern hemisphere; and thence come the northern Winter and the southern Summer. The inhabitants of the northern hemisphere strive to compensate for the deficiency of the Sun's heat by additional clothing and additional contrivances for procuring artificial warmth in their dwellings, while the inhabitants of the south luxuriate in the overarching light and heat of the Sun. Our emigrant countrymen in New South Wales and Van Diemen's Land experience the joys of Summer at the time when we are striving to exclude from our hearths the chilling blasts of Winter. If a vessel be six months performing the voyage from England to Australia, and leave England in the middle of Summer, it reaches Australia also in the middle of Summer; that is, it would have a northern Summer at the commencement of the voyage in June, and a southern Summer at the termination of the voyage in December: the vessel follows the *declination* of the Sun in the seasons; that is, its diminishing and increasing distance from the equator. When the vessel set sail, the Sun was vertical considerably to the north of the equator: as the vessel crossed the line, the Sun was vertical thereabouts at the same time: and when the vessel arrives at its destination, the Sun has arrived at its greatest southern distance from the equator.

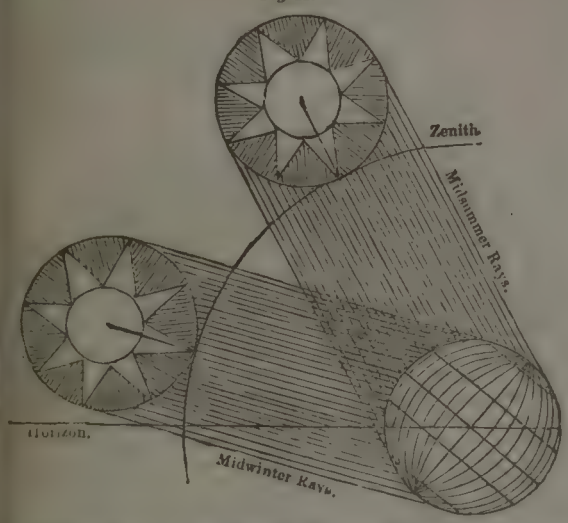
Such is the effect which the obliquity of the Earth's axis produces on the succession of seasons: if that axis were perpendicular to the plane of the Earth's orbit, or, which amounts to the same thing,—if there were always some part of the equator precisely between the centres of the Sun and the Earth, we should have no vicissitudes of seasons, because the Sun would be always at an equal distance from both poles.

We have stated * that the Sun is nearer to the Earth in the Winter than in the Summer; and it would seem that the Earth should receive a larger portion of heat in December than in June; but the obliquity of the Earth's axis, which gives rise to the phenomena of seasons, almost altogether obviates the mere effect of propinquity. The consequence of this obliquity is that, in the middle of Summer, the Sun attains an *altitude*, or elevation, above the horizon, of sixty-two degrees; while in the middle of Winter, he does not reach higher than fifteen degrees, in the latitude of London. This difference of meridian-altitude is due to the greater or less distance of the spot, where the sun is vertical, from the parallel of latitude in which London is

* See *Saturday Magazine*, Vol. XIII., p. 35.

situated: and, as the sun passes round our globe every twenty-four hours, it is constantly describing a winding course from one tropic to the other. It is this *spiral* or winding motion, which the poet Thomson alludes to in our quotation at the beginning of this paper. Now the simple circumstance of the Summer altitude of the Sun increases the amount of heat received, in two different ways; first, the direct rays of the Sun have more power at a high, than at a low elevation, because they have a less thickness of atmosphere to pass through; second, a longer time must be employed by the Sun in attaining a great altitude above the horizon, than in attaining a smaller altitude; so that he must then be above the horizon a greater number of hours during the day, and consequently shed a larger amount of light and heat in the case of the greater altitude than of the smaller. These are occurrences with which we are familiar from year to year, because they exert too extensive an influence on the affairs of life to escape our notice. If, however, we compare these occurrences with the different positions of the Earth, as represented in the frontispiece, we shall see that the whole depends upon whether the northern hemisphere, in which we live, is turned nearer to, or farther from, the Sun, than the southern hemisphere.

Fig. 22.



SUMMER AND WINTER ALTITUDES OF THE SUN IN THE LATITUDE OF LONDON.

But we cannot help noticing that, as the southern hemisphere has its Summer while we have our Winter, although we may not feel our Winter to be much mitigated by greater propinquity to the Sun at that season, it would follow that the southern Summer should be warmer and the Winter colder than with us; and the testimony, if we may rely upon it, of those who have tried the experiment in both regions of the world, corroborates the inference which science had previously drawn.

Now, in order to estimate the real position of the Earth in space at any given time, or the apparent position of the Sun, the astronomers of old time devised a method, which is still in use, and which we now proceed to detail.

The myriads of stars with which the heavens are studded, and whose glittering brilliancy forms such a sublime object of contemplation in our long Winter nights, we call for the most part *fixed;* as we find them maintain constant distances and positions with regard to one another: this circumstance gives them a value as standards, by which we may compare the motions of other bodies. If we use a twelve-inch rule to measure the distance between two points, the value of the rule depends upon the circumstance that the inches are always exactly the same distance apart; and so it would be with any other standard of measurement. When we consider that the Sun, immensely distant as he is, is yet infinitely nearer than the fixed stars, whose distance has never yet been ascertained, we shall perceive that he must very frequently appear to come between the Earth and some one star, so as to conceal the star and the Earth from each other. It has, therefore, been found convenient to refer the position of the Sun to that star, the position of the latter being previously known.

By this plan astronomers can describe to one another and to their readers, the position of any of the moving heavenly bodies. In the early ages, when the Chaldean shepherds watched the heavenly bodies through the clear and serene atmosphere of Syria and Mesopotamia, and at a later period when the Arabians cultivated astronomy, the stars were parcelled out according to some fancied resemblances to animals and other objects, as may be seen on a celestial globe. In many instances it baffles both the eye and the imagination of a modern observer, to detect any resemblance to the objects named in this celestial menagerie; but in so far as it enables us to map out the stars into convenient and small portions, the arrangement is of service. Each of these sets of stars is called a *constellation*, or assemblage of stars. It is to this plan of comparing the clusters of stars to the forms of certain animals and other objects, and the practice of representing them on our globe, that Darwin alludes in the following lines:—

> So erst, ere rose the science to record
> In lettered syllables the volant word;
> Whence chemic arts, disclosed in pictured lines,
> Lived to mankind by hieroglyphic signs;
> And clustering stars, portrayed on mimic spheres,
> Assumed the forms of lions, bulls, and bears.

In the course of the circuit which the Sun appears to make among the stars in a year, the ancients managed to trace out resemblances to twelve objects in particular, each object being represented by a cluster of stars, through the midst of which the Sun had to pass. The Latin and English names, and the symbols by which these are known, are the following:—

Aries	the Ram	♈
Taurus	the Bull	♉
Gemini	the Twins	♊
Cancer	the Crab	♋
Leo	the Lion	♌
Virgo	the Virgin	♍
Libra	the Balance	♎
Scorpio	the Scorpion	♏
Sagittarius	the Archer	♐
Capricornus	the Goat	♑
Aquarius	the Waterman	♒
Pisces	the Fishes	♓

These twelve are called the *signs of the Zodiac;* this latter term being derived from the Greek for an *animal.* The remaining constellations, north and south of the Zodiac, amount to eighty-two.

Now, when the Sun is said to be in Aries, for instance, it means that he is situated between the Earth and that cluster of stars, which is named after the *Ram;* and so accordingly with any other cluster of stars. When these names were first given to the different sets of stars, the Sun, on the 21st of March, was about coming between the Earth and the sign Aries, or Ram, and that position was called the *first point of Aries;* for a long series of years, therefore, the Sun arrived at the first point of Aries on the 21st of March. In order now to obtain precision in naming the position of the Sun at any other period, the whole apparent circle described by him was divided into twelve equal parts; whether or not these parts exactly coincided with the outlines of the clusters of stars from which they were named. Each of these portions, or signs, was further divided into thirty equal parts, called *degrees,* so that the position of the Sun at any period could be expressed with great accuracy. This apparent motion of the Sun is from west to east,—or from the sign Aries to Pisces,—and results from the motion of the Earth in the same direction.

In the course of ages, however, it was found that the Sun did not occupy the same position in the constellation Aries on the 21st of March, as he had occupied at an earlier period. This is occasioned, not by a motion of the stars, but by a change in the point of the Earth's orbit at which the two hemispheres are equally exposed to the Sun: a point, which is generally expressed as that in which the plane of the equator cuts the plane of the ecliptic. This point is called the *equinox,* from the circumstance that the day and night are equal to all parts of the world, when the Sun is at the point of intersection. This motion of the equinox is called the *precession of the equinoxes;* or more properly the *recession,* because they appear to travel *backwards,* and the signs *forwards:* it is occasioned by the attraction of the Sun and Moon for the mass of terrestrial matter at the equator. This precession is, however, so

exceedingly slow, that it has taken about two thousand years for the equinoctial points to recede through one sign, or 30°, from the point where it was fixed by Hipparchus, who was called the "father of astronomy." The vernal equinox, or the 21st of March, now occurs when the Sun is actually in the constellation Pisces; but still, for the convenience of maintaining the same nomenclature, the Sun is *said* to enter the first point of Aries on the 21st of March: it therefore results that the *sign* Aries does not correspond with the *constellation* Aries.

We now understand what is meant by the tropic of Cancer, and the tropic of Capricorn; and we shall also see in what way the signs of the Zodiac become symbols, as it were, of the kind of season which we experience, by merely considering that the Sun is between us and those constellations. For instance, when Spring is about verging towards Summer, the effect is thus alluded to:

> At last from Aries rolls the bounteous Sun,
> And the bright Bull receives him. Then no more
> Th' expansive atmosphere is cramped with cold;
> But, full of life and vivifying soul,
> Lifts the light clouds sublime, and spreads them thin,
> Fleecy and white, o'er all-surrounding Heaven.

In the middle of a northern Summer the Sun is in the sign Cancer, and at that time the inhabitants of that portion of the Earth where the tropic of Cancer is situated, have the noon-day Sun precisely over their heads; that tropic being the most northern situation in which such a circumstance occurs. From thence the Sun gradually travels in a spiral manner down towards Capricorn, during which time Autumn's milder heat succeeds to Summer's glow,—

> When the bright Virgin gives the beauteous days,
> And Libra weighs in equal scales the year;
> From Heaven's high cope the fierce effulgence shook
> Of parting Summer, a serener blue,
> With golden light enlivened, wide invests
> The happy world. Attempered suns arise,
> Sweet-beamed, and shedding oft through lucid clouds
> A pleasing calm; while broad, and brown, below
> Extensive harvests hang the heavy head.

Again, when the Sun is in the sign Capricorn, the inhabitants of the line called the tropic of Capricorn have their noon-day Sun vertical. For ourselves and the northern hemisphere, it may be remarked that at this season, when

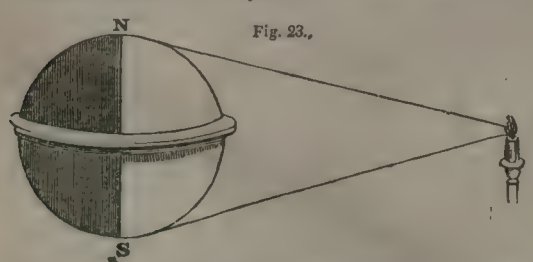
> ..... the cheerless empire of the sky
> To Capricorn the Centaur Archer yields,
> And fierce Aquarius stains th' inverted year;
> Hung o'er the farthest verge of Heaven, the Sun
> Scarce spreads through ether the dejected day.
> Faint are his gleams, and ineffectual shoot
> His straggling rays, in horizontal lines,
> Through the thick air; as clothed in cloudy storm,
> Weak, wan, and broad, he skirts the southern sky;
> And, soon descending to the long dark night,
> Wide-shading all, the prostrate world resigns.

If, in astronomical works or almanacs, the reader should meet with such expressions as "the Moon is in Aries," or "a conjunction will take place in Libra," &c., he will at once understand that he must look for this event in the cluster of stars forming such a constellation, although he may feel quite certain that the Sun, or Moon, or planets, are much nearer to him than the constellations to which he refers them as a background, and to which they seem, at the time, to belong.

DAY AND NIGHT.

We will now explain the causes of the different amount of *light* which we receive at different hours of the day, and at different seasons of the year.

Fig. 23.

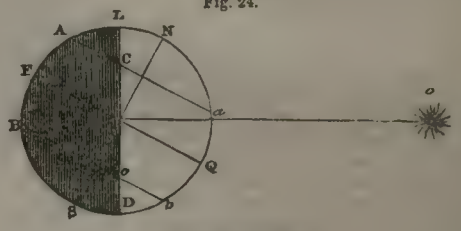


The Sun is the great source of light to the solar system; and without him, all would be dark and invisible: we must therefore direct our special attention to the position of the Sun, in order to understand the changes from light to darkness.

The question of day and night depends upon this principle, that one half of a globe, and no more, is illuminated by one source of light; as we see in the annexed figure. If the candle is placed in the plane of the equator, for instance, then, as the globe is turned round, one hemisphere is constantly illuminated from north to south.

But, now suppose we have a miniature representation of the Earth, and suppose the Sun at *o* to be shining on the parts at *a* from some distance on the right. We then find

Fig. 24.

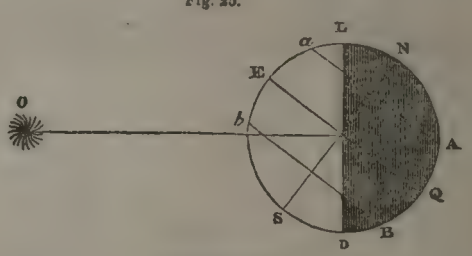


SUMMER SOLSTICE.

one-half of the globe illuminated, and the other half shrouded in darkness. If N S be the axis of the globe, round which it may be supposed to revolve, then E Q is the equator, B *a* the ecliptic, and A *a*, B *b*, the two tropics. The line L D separates the dark from the illuminated hemisphere, and is therefore the *real* horizon. Let the spot *a* represent any given place, and let us see what will occur if the globe revolve on its axis N S. In its present position, the spot *a* receives a large and continuous amount of light from the Sun; because he is not invisible until *a* arrives at the position C: when, however, the globe has turned half-round on its axis, we find the place in question at A, where it is shrouded in darkness. These effects, it will be perceived, are brought about by the motion of the globe on its axis. Furthermore, we see that the North Pole has constant day, and the South Pole constant night; for, as the globe revolves upon N S, L N must always be in the light, and S D in the shade. Again, suppose the three lines A *a*, E Q, B *b*, to be the parallels of latitude of certain places; at A, E, and B, it is midnight,—at C, at the centre, and at *c*, it is sunrise; and at *a*, Q, and *b*, it is mid-day. As our figure represents the time of the Summer solstice, we see that, at the North Pole, there is no night; at the tropic of Cancer, there is a short night and long day; at the equator, the day and night are equal, as is always the case; at the tropic of Capricorn the night is long, and the day short, and at the South Pole there is continual night.

We will now take the case of the Winter solstice, when the former positions will be reversed, as we see in the accompanying figure. The globe, which is illuminated as

Fig. 25.

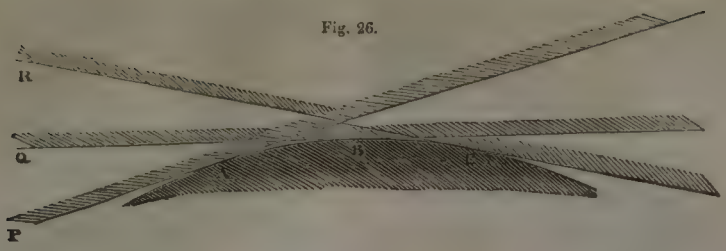


WINTER SOLSTICE.

to one hemisphere by the Sun at O, revolves on its axis N S, so that L N is constantly in the dark, and S D constantly in the light. The places on the northern parallel *a* A, have a short night and long day; at E Q they have the day and night equal; and at the southern parallel *b* B, a long day and a short night; at S there is constant day. At the equinoxes, the real horizon passes through the poles.

Now, the surface of the Earth, to a spectator standing on it, does not seem to form part of a globe, because the curvature is so very gradual: it seems to be a flat surface, the *boundary* of which is called the *visible horizon*: it follows, therefore, that every different spot on the Earth's surface has a different horizon. When, therefore, we speak of sunrise, we mean that the Sun first makes his appearance above the horizon of the place we are in. If, then, each separate place has a different horizon, it follows that the absolute time of sunrise is different at the different places.

Fig. 26.



In the above figure, A B C is a segment of the Earth's surface. The horizon of A is in the direction P A; that of B in the direction Q B; and that of C in the direction C R. Now, if we imagine the Sun rising on the left hand, it is evident, by inspection, that the people at A must see him when he shall have arrived at P; that the inhabitants at B must wait till he shall have arrived up at Q; and that the people at C will only begin to see him at R; or, more strictly speaking, the Earth revolves in the direction C B A, and the horizon of each place rolls towards the Sun.

REFRACTION.

From what has been stated, and from the circumstance that the Sun is the source of light to the Earth, it would seem that the moment the Sun set, or became concealed from us, we should at once be immersed in darkness; a transition so sudden, that the presence of the stars, or even of the Moon, would not be sufficient to recompense us for the deprivation of the Sun's light. All this would occur, if there were no atmosphere surrounding the Earth. The atmosphere, which supplies us with the means of respiration, and with a medium for the communication of sound, which supports combustion, which is an aërial ocean in which birds can float,—this same atmosphere, wrapped round us like an invisible garment, serves to soften the intensity of the noon-day heat of the Sun, to give him his ruddy colour at rising and setting, and also to furnish us with that subdued light which, under the name of *twilight*, moderates the change from light to darkness, and prepares us by degrees for the still, cold, calmness of ni ht. We must explain how this occurs.

When a ray of light is passing through a transparent body, it moves in a straight line, so long as the medium remains of the same density; but if any change occur in the density, or compactness, of this medium, the rays become bent out of the straight line, the bending taking place towards the denser portion: this bending is called *refraction*. Now, the atmosphere which surrounds the Earth consists of a light elastic fluid, not $\frac{1}{770}$th part so heavy as water; so that the upper portions press on those which are lower, and make them more dense or compact than they otherwise would be; this compression gives to the lower portions of the atmosphere a power of refracting rays of light more than the upper portions.

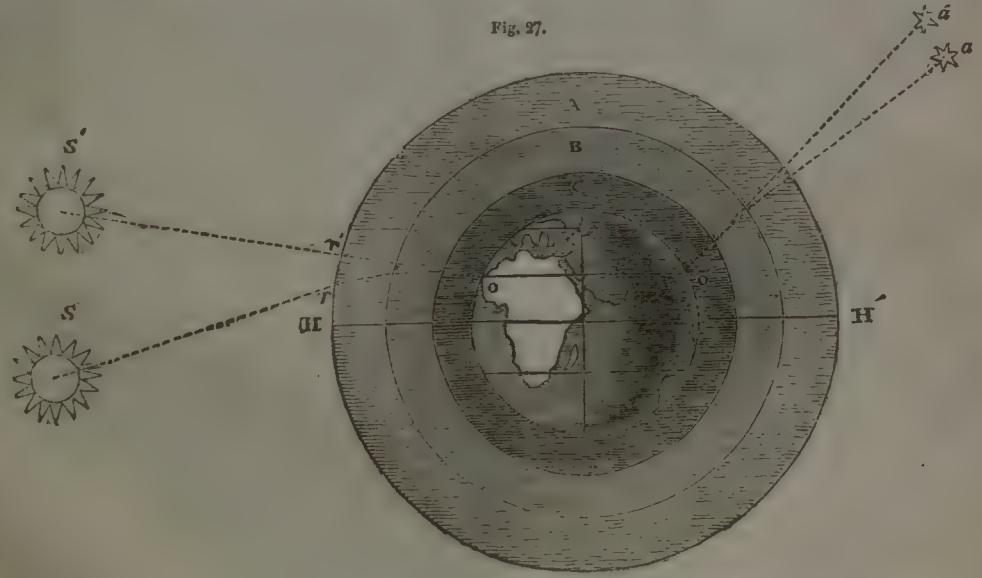
The atmospheric air, then, is most dense at the surface of the Earth; and its refractive power gradually decreases, until we get to a density of air so small, that it ceases to disturb the direct progress of a ray of light. When a ray falls upon a medium of varying density, such as the air, it will be turned gradually out of its path so as to form a curved line, as shown in the figure, where we have the Earth surrounded by an atmosphere of varying density, the density at C being greatest, and least at A. Now, if H H′ be the horizon of an observer, and s be the Sun actually below his horizon, the ray s r will proceed in a right line until it meets with the atmosphere A, when it will begin to turn out of its previous path; and were the refracting medium of the same density throughout, the new path of the ray would be in a right line also; but not in the same direction as the first. But, as we have seen that the density of the refracting medium increases as we approach the Earth, the ray is consequently more refracted on entering the strata B and C, so that an observer at O receives this refracted ray in a curved line; but, as he can only see an object in straight lines, it follows that he seems to receive the Sun's rays at r', and that an image of the Sun is seen by him at s′

Hence it is inferred that the heavenly bodies are never seen in their true places, except when in the zenith; refraction having no effect on a vertical ray. Refraction is greatest at the horizon, and decreases upwards, as may be noticed in the case of the star a, which is seen at a' by an observer at o'; but, being higher up, its rays are not so much refracted as in the former case. The altitude of the heavenly bodies seems greater, therefore, than it really is, in proportion as we come down to the horizon, where the air is thicker and more humid. The effects of refraction were first noticed by Ptolemy, the Egyptian astronomer, about the year A. D. 140.

While the Sun is within 18° of the horizon, or for an hour and twelve minutes before sunrise and after sunset, we have some light from the Sun; and for many nights about the time of the Summer solstice, the Sun being within 18° of the horizon, we have no actual night.

It follows, therefore, curiously as it may seem, that, when we seem to see the Sun just above the horizon at sunrise

Fig. 27.



and sunset, he is not actually above the horizon, but only seems so, in consequence of the bending round of his rays towards the parts where we may be*. Again, the thickness of the stratum of horizontal air makes the Sun and Moon appear larger than when their rays come down to us less obliquely; and, owing to the difference of the density of the air at the upper and lower parts of the disks of the Sun and Moon, these bodies are often seen of a compressed or oval form.

TIDES.

We must now recur to the consideration of the direct influence of the Moon upon our globe, and give our attention to the third class of phenomena which we enumerated in the former paper, as resulting from the joint operation of the Sun, Moon, and Earth—the TIDES.

In our first paper† we stated that one of the properties of matter is to attract other matter towards it: for example, that a stone drops to the Earth, by virtue of the Earth attracting the stone; that the planets retain their wonted distances from one another, and from the Sun, by virtue partly of the operation of this law.

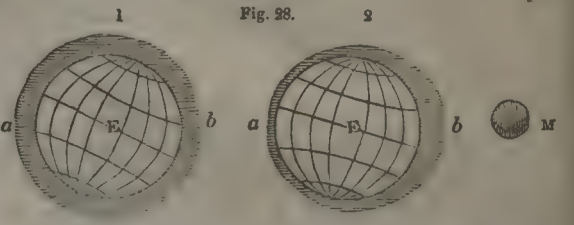
Now it will not be difficult to conceive that, if attraction has reference to all matter, and if the Earth and Moon attract each other reciprocally, the Moon's attraction, if not felt to influence the *solid* matter of the Earth, may produce a great effect on that form of matter which is most easily moved, *i. e.*, the *liquid* form. Now, if we exert an attractive or moving power of any kind, on a solid mass, such as of iron, the whole mass will be moved at once, if any part be moved; because the particles of which it is composed are so closely and intimately bound together, that a pressing or pulling force will not separate them; unless indeed it be very enormous. With a liquid, however, we know that such is not the case. If we move the finger rapidly to and fro in a basin full of water, we shall separate some of the water from the remainder, and propel it over the edge of the basin; we can dip a vessel into the water, and take out a portion of it, without altering the nature or appearance of that which remains. A solid body may be immersed in the liquid, so as to be completely surrounded by it, thus showing the ease with which the bulk of water may be separated, so as to allow other bodies to insinuate themselves between its particles. Nothing of this kind happens with *solid* bodies; and this difference is the sole cause of the production of Tides, which we proceed to explain.

The reason why the Earth revolves round the Sun, instead of round any of the planets, is, that the large mass of the Sun exerts a stronger attraction than any of the planets. Again, the reason why the Moon revolves round the Earth, is, that she is much nearer to the Earth than to any other planet; while at the same time she is much smaller than the Earth.

The distance between the Earth and the Moon is regulated by the amount of the attraction of one for the other, and by the velocity of the Moon's motion; and as those quantities are equal year after year, there is no perceptible disturbance exerted by one on the other. This is, however, only true with reference to the Earth, considered as a *whole*: we must bear in mind that three-fourths of her surface is covered with water, a substance more likely to be influenced by an attractive force than a solid body, owing to the ease with which the particles of water glide over one another. It is found that, although the Moon's attraction of the Earth, as a whole, is neutralized by the counteracting attraction of the Earth for the Moon; yet the waters on the surface of the Earth, hanging loosely together as it were, suffer a perceptible inclination towards that quarter where the Moon may be situated.

Let us suppose, while discussing the Theory of the Tides, that the *whole* of the exterior of the Earth consists of water. This will make our illustrations clearer. We will also first suppose that there is no Moon to act on this watery surface of the Earth; then the waters would maintain their wonted level, which we may represent by the shaded ring *a b* surrounding the Earth E. (No. 1, Fig. 28.) But suppose now (No. 2) the Moon, M, to exert her influence on the surface of the Earth; then we must suppose that the waters on the Earth's surface would flow towards the side *b* of the Earth nearest to the Moon, in consequence of her attraction of them, and that they would thus be drawn up into a protuberance by which an additional quantity of water would be collected on the side *b*, which could only occur by a deprivation of the proper quantity elsewhere, which is indicated by the diminution of the width of the aqueous ring at the other parts, and chiefly at *a*.

Fig. 28.



But here, against all this, we have a remarkable circumstance to notice. We actually find in nature that not only is the water nearest to the Moon drawn towards it in the way just described, and is therefore elevated, but the water on the *opposite* side of the Moon is elevated in like manner. Now it is plain that the Earth itself, the solid part (especially in a central direction,) must feel the attractive or *drawing* influence of the Moon in a greater degree than the portion of water which is most remote from the Moon. The real form of the liquid surface therefore becomes something like that of an egg, the small ends being formed by the protuberant water at each extremity, and the flattened sides being due to the diminution of the quantity of liquid which would otherwise belong to them: the real nature of this rise of the waters is therefore better represented by the annexed figures, where it will be seen the waters are collected in greatest quantity at the sides nearest to, and farthest from, the Moon, that is, at the *zenith* and *nadir*. In fig. 29 the Moon is new, or in conjunction; in fig. 30 the Moon is full, or in opposition. Hence the same effects are produced *twice* in the lunar month—at *new* and *full* moon.

We have hitherto considered the action of the Moon only on the waters of the Earth; we must now refer to that of the Sun. Although the Sun is so much larger than the Moon, yet his distance exceeds that of the Moon in a still greater ratio; so that his specific attraction for the waters of the Earth is less than that of the Moon; the attractive force of the Sun being to that of the Moon (as is generally considered) 1 to 5. We have therefore to add, or to subtract, the Sun's attraction, according as it assists or opposes that of the Moon. Suppose (fig. 31.) that the Moon is in *quadrature*; that is, in the first or last quarter. In this state, as before explained, the Sun S, the Earth E, and the Moon M, form a right-angled triangle. The Sun acts on a part of the Earth *b*, which is a quarter of a circle removed from the spot *a*, on which the Moon acts. In fact the Sun acts precisely on the part depressed through the Moon's action. As the Moon, therefore, would cause the waters to rise at the two parts *a* and *a'* in the proportion of 5, while the Sun's influence at *b* and *b'* is in the proportion of 1, we have by these means four protuberances instead of two. We have represented these as separated by indentations, for the sake of clearer illustration. Hence by subtracting the Sun's effect 1 from the Moon's effect 5, we have remaining 4, which expresses the highest tide in this position of the Sun, Moon, and Earth.

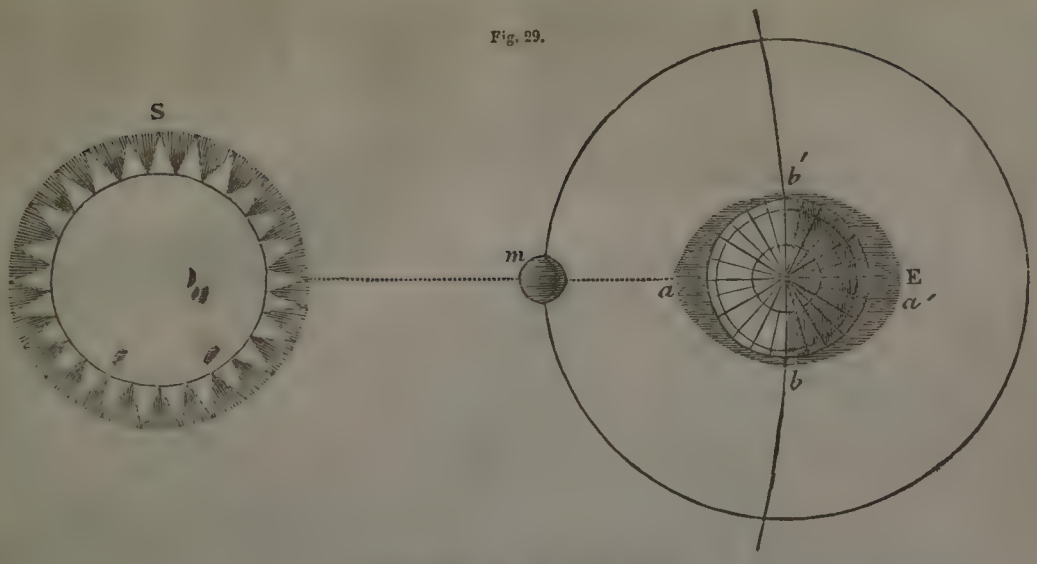
But now suppose again that the moon is either *full* or *new*: the three bodies in question are then in a line, and the action of both Sun and Moon will be concentrated to the same points, and the rise will be greater than if the Sun had not been present. It matters but little whether the Moon be new, as at *m*, fig. 29, or full, as at *m*, fig. 30; because in either case the effect is to raise the waters at *a a'*, and to depress them at *b b'*; for the attractive force of the two bodies, when the Moon is new, operates most at *a*, and least at *a'*—partially at *b* and *b'*. In the sinking down of the water at *b* and *b'*, the greater portion is carried off towards *a*, and a smaller portion goes round to help to raise the parts at *a'*, where the water is least affected by the attracting bodies. The like reasoning may be used in reference to the full Moon (fig. 30,) where the rise at *a* and *a'* is followed by the subsidence at *b* and *b'*.

It should, however, be observed in addition, that the curious circumstance of high water at the zenith and nadir at the same time, has been accounted for by reference to the centrifugal force of the water of the Earth; which force

* It was in consequence of this effect of refraction that on the 20th of April, last year, the Moon rose eclipsed, before the Sun had set: which, but for refraction, could not possibly have happened; or the three bodies would not have been *in a line*.

† See *Saturday Magazine*, Vol. XII. p. 126.

Fig. 29.



SPRING TIDE AT THE NEW MOON.

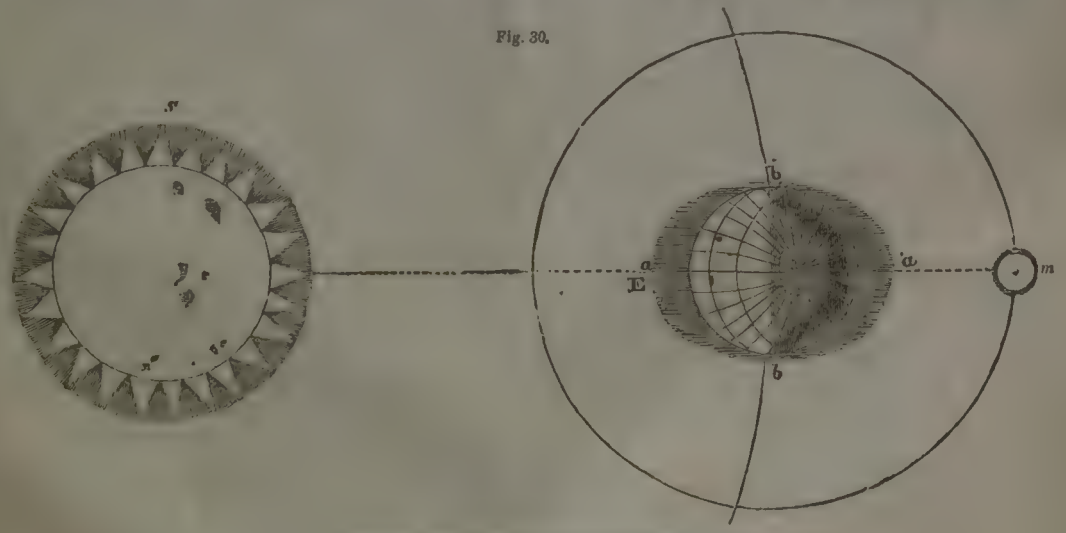
is generated by the rotation of the Earth on its axis, and is greatest at the contrary side of the Earth to the Moon: so that high water at the side nearest to the Moon is due to her positive attraction; but on the side farthest from the Moon to uninterrupted centrifugal force.

These fluctuations of the waters of the ocean constitute TIDES. As the Earth revolves on its axis the protuberant waters travel in the opposite direction, being chiefly influenced by the Moon; and to a certain extent by the Sun. The Moon comes to the south of us every day later than on the preceding day and the time of flux or high tide at any place is also later every day than on the preceding, in the same proportion; which is a sufficient indication of the superior attraction of the Moon. As there are two opposite protuberances, or high tides, on the surface of the Earth at one time, it follows that, in its turning once on its axis, every part of the Earth experiences two high tides and two low tides intermediate between them. These alternations in the open sea are at intervals of about six hours asunder; but in rivers great irregularities occur; where, very generally, owing to the impediments of the banks, the tide rises higher than in the open seas. In order to supply the additional quantity of water to those two portions of the Earth which are in a line with the centres of the Moon and Earth, the rivers and seas on each side must part with a portion of their waters, which is returned to them about six hours afterwards; but this flux and reflux, or ebb and flow, is much retarded by the nature of the channels through which the water has to flow; so that high tide occurs at very various times in parts not much distant from each other.

If the Moon were stationary, an ebb and flow would occur every twelve hours; but as the Moon revolves round the Earth, the Earth must make rather more than one revolution on her axis, before two ebbs and two flows can be completed: hence high water is about three-quarters of an hour later on each succeeding day. The tides at new and full moon, which are greater than those when the Moon is in quadrature, are called *spring* tides, and the latter *neap* tides. The tides suffer a variation in amount from another cause. We have seen that the Moon revolves in an elliptical orbit; so that at one time she is nearer to the Earth than at another time. Now if the spring tide happen when the Moon is at her shortest distance from the Earth, the tide will be greater from that cause also than if she were more remote; and if at the same time the Earth be at its nearest distance from the Sun at the time of spring tide, the time will then be the *greatest* that can occur.

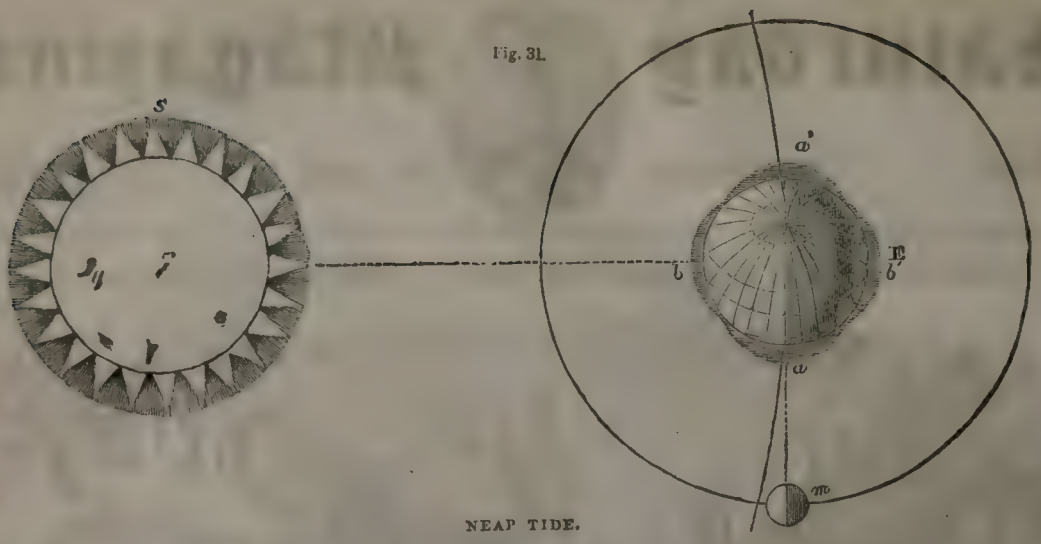
It is not, however, high water at the parts *immediately under* the Moon: the attraction of the Moon takes time to produce its full effect; so that three hours elapse, even in the open ocean, before the completion of the highest tide: that is, if the Moon came over any given spot at twelve o'clock, it would not be high water there until three. An analogous circumstance is observed in the hottest month of the year, and the hottest hour of the day. The Sun sheds most heat on our portion of the Earth in June; yet we find July and August to be hotter: again, he sheds more heat at twelve o'clock than at any other hour; yet we find one and two o'clock to be hotter. This arises from the fact that the Sun's influence is felt as if it were *accumulated*, after his greatest direct effect is passed, by reason that the earth is *already* saturated with heat. In like manner, the spring tide is not until about three days after new, or full moon; and the greatest spring tide not until February and

Fig. 30.



SPRING TIDE AT THE FULL MOON.

Fig. 31.



NEAP TIDE.

October. The Moon's effect is felt, in fact, after it has ceased to operate, on the principle in Mechanics, that the effect of a force continues even after the motive power has subsided.

When the Moon is above the horizon more than twelve hours in one day, one of the tides is higher at that place than the other on that day, because the Moon is acting upon that spot for a longer period: but if the Moon be above and below the horizon for about equal periods, the two tides are also about equal. The tides are very unequal at different places, chiefly on account of the nature of the channel in which the water is confined. At Plymouth the difference between the highest and lowest tide, on the same day, is sometimes twenty-one feet; while at Mount St. Michael it is sometimes eighty or ninety feet.

As was observed in the second paper on Navigation, the ancients, whose naval pursuits were long limited to the Mediterranean Sea, were ignorant of tides; this sea, as likewise the Baltic, not being apparently so affected by the solar and lunar influence, as to exhibit an ebbing and flowing of their waters. These seas have inlets so narrow, as not to allow of a free passage of the water; and the attractive influence has passed away before any very sensible effect is produced. In the case of these seas, and also of lakes, the Moon's influence is equally exerted; and, there being no swell, is less perceptible. Though we learn that the cause of the tides was first suspected by Pytheas, a navigator, who flourished 400 B.C.*, yet Newton was the first to demonstrate that the tides were the result of the attraction of the Sun and Moon; and thus did he add another to the long list of benefits which he conferred on posterity, by explaining those sublime and beautiful laws, according to which it has been ordained that the world shall be governed, by Him who—

> Gives and guides the Sun's attractive force,
> And steers the planets in their silver course;
> With heat and light revives the golden day,
> And breathes his spirit on organic clay;
> With hand unseen directs the general cause,
> By firm, immutable, immortal laws.

Air, being lighter than water, and being likewise nearer to the moon, must be more within her influence: hence there are doubtless aërial tides; of which if the nature were well understood, the subject of Meteorology and of the *weather* generally, would be more decidedly a *science* than it now is.

LATITUDE AND LONGITUDE.

For the origin of the terms *latitude* and *longitude*, we refer our readers to Vol. XII. page 208.

In the modern acceptation of the terms, *latitude* is the distance of any place north or south from the equator; and *longitude* its distance east or west of any given meridian. Thus, the line of latitude is always at right angles to the line of longitude; and the spot, denoted by a certain latitude and longitude, is situated where these lines cross each other. This mode of marking out the position of a place on the surface of the Earth, is referable to the motion of the Earth on its axis; which motion is the most constant and equable in nature.

* See *Saturday Magazine*, Vol. XII., p. 204.

In the subjoined figure, we have a representation of the terrestrial globe. The North and South Poles, P and Q, are the extremities of the imaginary axis; or those points which do not revolve at all. The equator, E M B R, is equidistant from these points. Lines parallel to the equator are called *parallels of latitude*; of which as many may be drawn as we choose; but it is usual in maps and globes to draw them through every 10° northward and southward: the space between every two parallels being then divided into ten parts, each of which is a *degree*. From P or Q to E or R are reckoned 90°, which is one quadrant of the globe.

It is usual for the principal nations in the world, which have cultivated science, and made themselves respectable in the opinion of fellow-nations, to reckon their longitude from the meridian of their own capital. Thus, the English reckon longitude from the meridian of Greenwich, which is, as it were, part of London, and is the site of the royal observatory. The French count degrees of longitude from the meridian of Paris.

Longitude is reckoned eastward and westward; and the meridians are usually drawn on globes and maps 15° apart, because the Sun passes over this extent of the Earth's surface in one hour; or all round the globe in twenty-four hours: so that there are twenty-four meridians, or *lines of longitude*, such as we see drawn from P to Q, where the line P A Q is the meridian of A. Each degree of longitude is, at the equator, about sixty-nine and a half English miles; and each degree, becomes less as we recede from the equator towards the poles, in consequence of the circles getting smaller.

In our next paper, we shall describe those planets whose orbits are exterior to the orbit of the Earth.

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NEWCASTLE-UPON-TYNE, AND THE GREAT NORTHERN COAL-FIELD. I.

VIEW IN NEWCASTLE, WITH ST. NICHOLAS' CHURCH.

HISTORY OF NEWCASTLE—CASTLE AND TOWN WALLS—CHURCHES—LITERARY SOCIETIES.

NEWCASTLE-UPON-TYNE, which within the memory of man was not undeservedly called "the Coal-hole of the North," has within the present century become one of the most beautiful towns of England, rivalling the metropolis itself in its architectural decorations. Its situation on the crest of the eminences on the north side of the Tyne, pointed it out to the Romans as a desirable military post; and they occupied it to protect the Ælian bridge, and defend the flank of the wall erected to repel the invasions of the Picts and Scots. The modern bridge over the Tyne occupies the place of the Roman structure, and the termination of the Roman line of fortifications is still called Wall's End, a name sufficiently familiar to the citizens of London, who procure their best coals from a colliery in its vicinity. After the Saxon invasion, Newcastle became one of the chief seats of the kings of Northumberland, who adorned it with so many monastic institutions that it received the name of Monkchester. When the Danes invaded England, a great body of them settled on the banks of the Tyne, and made Northumberland a principality enjoying a qualified independence. The Anglo-Danes were a more warlike people than the Saxons: they continued their resistance to William the Conqueror after the rest of England had submitted; but being defeated on Gateshead Fell, the cruel Norman levelled Monkchester with the ground. In the course of the Conqueror's subsequent wars with Scotland, the importance of having a fortress to protect the passage of the Tyne became apparent, and a new castle was erected by Robert Curthose, the Conqueror's eldest son, on the height which commands the bridge, and from this structure, which still exists, the town derives its present name. During the wars between the English and Scotch many sanguinary battles were fought in the vicinity of Newcastle, and it is plausibly conjectured that many of the pestilences which wasted the town during this period were caused by the heaps of slain left unburied, or but partially buried, after these ruinous combats. But it is not necessary to dwell upon these almost forgotten struggles; and we turn with pleasure to a much more important and interesting subject, the origin of the coal-trade, to which Newcastle owes its wealth and celebrity.

The first notice on the subject is found in a charter of Henry III., which grants permission to the burgesses of Newcastle to work the coal-mines in their neighbourhood. So eagerly did they avail themselves of this grant, that in 1306 the parliament complained to the king that the atmosphere of London was dangerously infected by the burning of northern coals, and begged that the use of this fuel should be restrained; and in 1325 coals were exported from Newcastle to France.

During the long struggle between Charles I. and his parliament, the citizens of Newcastle were distinguished by their fidelity to the royal cause; and when the unfortunate monarch had surrendered to the Scotch, and was brought a prisoner into the town, they received him with all the usual honours of royalty, and showed much sympathy for his sufferings. One anecdote of the fallen monarch, during his captivity at Newcastle, deserves to be recorded. In order to conciliate the Scotch, Charles was constant in his attendance at Presbyterian places of worship, although the Scotch preachers virulently assailed him from the pulpit, and ascribed his misfortunes to the vengeance of heaven. One minister, after a sermon

full of coarse personal reproaches of his majesty, called for the fifty-second psalm, which in the Scottish version begins—

Why dost thou, tyrant, boast abroad,
Thy wicked works to praise? —

upon which the king stood up, and called for the fifty-sixth psalm—

Have mercy, Lord, on me, I pray,
For man would me devour.

The congregation, in defiance of the tyranny then exercised by the presbyterian clergy, showed greater deference for fallen royalty than for the minister, by singing the psalm for which the king had called.

At the time of the Revolution the people of Newcastle were conspicuous for their zeal to establish a protestant government. They hurled into the river a beautiful statue of James II. in copper, which had had been erected in front of their Exchange; and when it was subsequently taken up, they used the metal to cast bells for the churches, as we find by the following curious entry in the books of the corporation:—"Ordered, that All Saints have the metal belonging to the horse of the said statue, except a leg thereof, which must go towards the new casting of a bell for St. Andrew's parish." Ever since that time the burgesses of Newcastle have been zealous adherents to the Hanoverian succession, and have embraced every opportunity of proving their loyalty.

Turning from the history of Newcastle to a description of its present condition, the most remarkable characteristic that we observe is the mixture of ancient and modern styles; all the features of an old feudal garrison existing amidst the bustle of commerce, the most sumptuous modern edifices, and a forest of masts from every quarter of the globe. This is peculiarly remarkable in the vicinity of the Castle, which, though frequently altered and repaired, has not lost much of its original character as a border fortress. Its chapel especially is an exquisite specimen of the rich and beautiful style of architecture adopted by the Normans in their ecclesiastical edifices, and there is no difficulty in tracing

The battled towers, the donjon keep,
The loophole grates where captives weep,
The flanking walls that round it sweep.

These outer walls were of great strength, and enclosed an area of three acres and one rood. The grand entrance was through the Black Gate, which was an outwork of considerable strength, defended by two portcullises, two drawbridges, and two barbicans, or flanking towers. Its remains are so surrounded by masses of houses huddled together without system or design, and by no means remarkable for their cleanliness, that it is difficult to determine its dimensions. There were three other entrances through posterns; the southmost of which led to the Castle Stairs, an immense flight of steps leading from the top of the hill to the river, with houses at each side, nearly all of which are tenanted by cobblers, so that the visiter can scarcely divest himself of the notion that he is ascending or descending a pyramid of old shoes.

The town-walls were twelve feet high on the inside, and eight feet thick; their extent from end to end was about two miles and one-eighth; they were defended by embattled gates and bastion towers, which, united to the natural fortifications of the Ouseburn glen and Pandon Burn ravine, rendered Newcastle one of the strongest places in England. Since 1745, the last time that they were put into a state of defence, great masses of the fortification have been removed, either to open commercial thoroughfares, or to make room for new edifices. However we may be pleased with modern improvements, we cannot but lament the destruction of the memorials of antiquity, especially when their removal is not demanded by imperative necessity. The removal of Westgate in 1811 was not, we think, required by public convenience; we wish that this monument of the wealth and munificence of Roger de Thornton had been spared. It is said that he rebuilt and beautified this gate to commemorate the time when he entered the town in a state of great indigence, as the rhyming tradition states,—

At the West gate came Thornton in
With a hap, a ha'penny, and a lamb-skyn.

The more recent removal of Newgate in 1822 was opposed by many of the inhabitants, who appealed in vain to the council for its preservation, but since that time the people of Newcastle have become chary of their remaining antiquities, and anxious to preserve all existing memorials of the time when their town was the great fortress of the North.

Among the ancient edifices of Newcastle, the church of St. Nicholas * is most conspicuous; the original structure, erected by Osmund, bishop of Salisbury, A.D. 1091, was destroyed by fire A.D. 1216, and the present building was not completed until A.D. 1359, since which it has received frequent and extensive repairs, not always in the best taste. The steeple of this church is one of the most singular creations of Gothic architecture; from the base of the four pinnacles on the top of the tower spring two lofty arches which intersect each other, and bear on their vertex a light square lantern, decorated with pinnacles similar to those of the tower. From the top of the lantern a tapering pyramidal spire rises tipped with a light vane, which gracefully harmonizes with the surrounding pinnacles. No description can convey an adequate idea of its effect, and accordingly Ben Jonson amused himself by describing it in the following enigma, which has been preserved traditionally, and is therefore pobably corrupted:—

My altitude high, my body four-square,
My feet in the grave, my head in the air,
In my sides are my eyes, I've five tongues of my own,
Thirteen heads on my body, and all of hewn stone;
I can direct you where the wind it doth stray,
And I tune God's precepts through twice in the day;
I am seen where I am not and heard where I is not,
Tell me now what I am, and see that you miss not.

St. Andrew's Church is said to have been erected by David, king of Scotland, who occupied Newcastle from 1135 to 1153: it suffered considerable damage in the siege of 1644. This church, and those of St. John's and All Saints, have been so modernized, that they have quite lost their original character.

Passing over the episcopal chapels and those belonging to various classes of dissenters, we shall now direct attention to the edifices built for secular purposes, and first notice the Guildhall, or Exchange. This edifice is situated in the lower and old part of the town, on the Sand-hill, near the south entrance of the town by Tynebridge. The houses in the neighbourhood are interesting and picturesque specimens of the old English style of architecture, but they are in many cases crowded together and pierced by lanes and passages, dark, dirty, and inconvenient. The original edifice was erected by Robert Trollop, an eminent architect. He lies buried in Gateshead churchyard, on the opposite side of the river, and the following quaint epitaph alludes to his building the Guildhall and Exchange:—

Here lies Robert Trollop,
Who made yon stones roll up;
When death took his soul up,
His body filled this hole up.

* See *Saturday Magazine*, Vol. III., p. 41.

Trollop added to these buildings a picturesque tower or steeple, said to have been very beautiful; but it was removed at the close of the last century, and its place supplied by an unmeaning front of plain masonry. The old tower obtained some notoriety from the circumstance of a pair of crows having built their nest on the weathercock in March, 1783. The nest was attached with great ingenuity to the hollow tube on which the vane was then fixed, and the nest was therefore turned round with every change of the wind; for several years the same crows built their nest and reared their young ones in this singular position.

The Mansion House is not far distant from the Exchange; it was rebuilt in 1691 at a cost of 6000*l.*, and was fitted up very sumptuously; its wainscots and staircase of carved oak are particularly worthy of notice. After the Municipal Reform Act, the new town council came to a resolution not to continue the establishment; the furniture was sold by auction, and the mansion itself let as a lumber warehouse. Fortunately the present tenant takes all possible care of the carvings and decorations, but he cannot prevent the accidents resulting from the passing and repassing of labourers with heavy loads, and unless the staircase and wainscots be speedily removed, their destruction is inevitable.

Newcastle being a county in itself, it has courthouses of its own in the Town Hall; but the courthouses for the county of Northumberland are erected on the Castle Hill, at a very inconvenient distance from the Town Hall; the nearest communication between them being up an almost precipitous ascent. The county courts are very convenient and elegant, but as they are within the precincts of the old castle, the access to them is very unpleasant. It has been proposed to erect both town and county courts in one building in the new part of the town, and it is to be wished that this useful improvement may encounter no obstacle from local interests or prejudices.

The Library of the Literary and Philosophical Society, stands near the junction of Westgate-street and Collingwood-street. No provincial town in Britain, and perhaps not even the capital itself, possesses an institution better managed, and in every way more creditable to its founders and supporters, than the Literary and Philosophical Society of Newcastle. It was founded in the year 1793, principally by the exertions of the Rev. William Turner, who still survives to witness its beneficial effects. The street front gives a very inadequate notion of the extent of the accommodations within. The principal entrance is from Westgate-street. The ground-floor contains a law library, a medical library, a spacious lecture-room, capable of accommodating five hundred persons, and an apparatus-room containing an extensive selection of chemical, electrical, optical, and mechanical instruments, for the use of lecturers and the members generally. The separation of the professional from the general library is a very great advantage; it is obviously capable of further extension, and we believe it is contemplated to add both military and naval libraries, amply provided with plans, maps, charts, &c. A handsome double staircase, ornamented with casts from the Elgin and other marbles, leads to the principal floor of the building. The library is eighty feet in length, by forty in breadth, and is forty feet high; it contains nearly fourteen thousand volumes. The books are allowed to circulate among the members, who may, if they choose, take out all the volumes of any work at the same time. The council, with very creditable liberality, affords additional facilities to persons engaged in preparing works for the press, such as permitting them to have several sets of books at a time, and to retain them for a longer period than ordinary readers. In the library are two noble pieces of statuary, the work of a native artist named Lough, who worked as a stone-mason at the building of the library, but who has since carried a very high reputation by his works as a sculptor. It contains, also, the busts and portraits of several eminent persons, mostly natives of Newcastle.

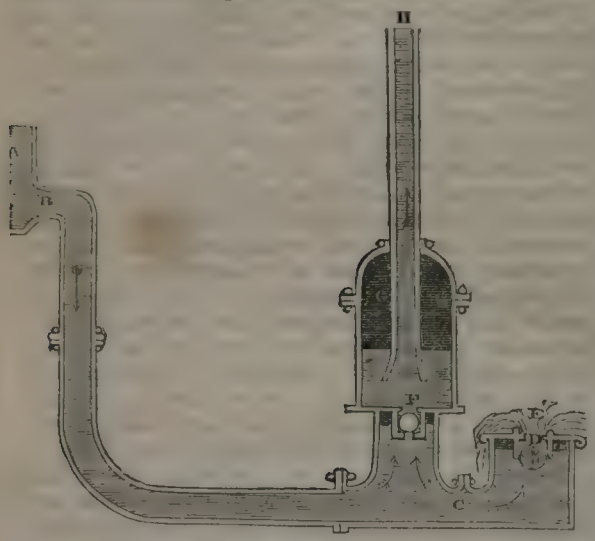
The rooms of the Natural History Society adjoin the library, and comprise a Museum of Natural History, a Geological Museum, the meeting-room of the Antiquarian Society, a room of Egyptian antiquities, a gallery of Roman altars, &c., and several store-rooms. All these are open to the public, free of charge, every day except Sunday, from eleven to four o'cock; they are, also, occasionally opened in the evening, to afford labourers and mechanics an opportunity of visiting them; and it is truly gratifying to add, that for several years no instance of ingratitude or dishonesty has occurred. It deserves to be added, that the taste for literature is widely disseminated in Newcastle, and that the average sale of books in proportion to the population, is greater than in any other part of the world.

THE HYDRAULIC RAM.

The Hydraulic Ram is a simple machine, by which water can be raised to a considerable height above its natural level; it is more frequently employed in France than in this country, but the simplicity of its construction, combined with its self-acting power, make it a desirable means for its intended purpose, where there is an abundance of water, and where the water which it would otherwise waste can be employed for other purposes. Montgolfier, the celebrated aëronaut, was the inventor of the Hydraulic Ram. He had observed, that if water was conducted, by means of a leaden pipe, from a cistern placed at a considerable height, immediately its flow was stopped by turning the cock, a sudden shock was felt, which, in many cases, would burst the pipe by its violence; this arose from the impetus the water had received in its descent being suddenly checked; reasoning on this fact, he contrived to avail himself of this power, which would otherwise have been lost, in the construction of his Hydraulic Ram.

Professor Millington mentions a circumstance, which produced similar results, and which occurred before Montgolfier's invention, It was necessary to conduct the water from a cistern, placed about halfway between the ground and the top of a large building in Bristol, to a place in the lower part of the house; this was effected by means of a long leaden pipe, but it was found that almost every time the cock was turned the pipe burst. To remedy this, a smaller pipe was soldered to the lower end of the supplying pipe, and conducted upwards to the cistern from which the water descended; this was done to prevent the waste of the liquid. When the success of this contrivance was put to the test, it was found that the force acquired by the water in its descent, was not only more than sufficient to drive a portion of it back again to the cistern through the smaller pipe, but capable of carrying a jet of water to a considerable height above that level; the small pipe was then continued to a considerable height farther, but still a jet of water was produced; advantage was taken of this result, and a reservoir of water was kept constantly supplied at the top of the house without any additional exertion. Many improvements have been made

in the Water Ram since it was originally constructed, and the annexed engraving, although not representing one of the most modern construction, will, perhaps, render the principle on which it acts more intelligible than if a more complicated machine were referred to.



Let A be the reservoir from which the water is derived; this will flow along the pipe B C with a velocity equal to the perpendicular height from B to C. The water flowing along the level part of the pipe C, will at first escape through the opening at E, but it will quickly by its force raise the hollow brass ball, or valve, D, so as to close the opening at E, and prevent its further escape; thus checked in its course, it presses with a sudden jerk against the valve F, which it raises from its support, and opens a way for its escape into the chamber G, and the ascending tube H; as soon as the effort of the water is exhausted, the valve F sinks into its bed, and prevents the water that has been introduced into the chamber above it from returning into the pipe B C. At the same time the valve D, falls into its bed, and leaves the hole at E open; the water again escapes for a time, again lifts the valve D and closes the opening, and again rushes into the chamber G, and this reciprocating action continues as long as water is supplied from the cistern A. The upper part of the chamber G is occupied by air, which, being compressed by the entrance of the water, by its elasticity assists in forcing it up the tube H. The number of strokes produced by these machines varies much, but they amount not unfrequently to from fifty to seventy in a minute. The loss of water when not wanted for other purposes is considerable, varying to from fifty to thirty per cent. of the total quantity discharged from the reservoir.

A MAN would do well to carry a pencil in his pocket, and write down the thoughts of the moment. Those that come unsought for, are commonly the most valuable, and should be secured, because they seldom return.—LORD BACON.

THOSE who know the value of human life, know the importance of a year, a day, and even an hour; and these, when spent amid the full enjoyment of the vital functions, of how much importance to our whole existence! It is therefore an eternal and irreparable loss, when time is not enjoyed as it ought.—STRUVE.

WE ought, in humanity, no more to despise a man for the misfortunes of the mind, than for those of the body, when they are such as he cannot help; were this thoroughly considered, we should no more laugh at a man for having his brains cracked, than for having his head broke.—POPE.

ELECTRICITY.

No. IV.

ELECTRICAL MACHINES.

HAVING described electrical machines, as they are usually constructed, we shall next endeavour to give some account of what we consider the best means of operating with them; explaining as we go along the use of each particular part of these instruments.

We begin with a cylindrical machine, which we must suppose to have been carefully cleaned, some fresh amalgam applied to the rubber, and the framework of the machine secured by a clamp to a strong table. The latter should be so placed that it may not be in contact with the walls or furniture of the room, and, if it can be avoided, not near a window, nor in a direct line between the fire-place and the door.

These arrangements being completed, if the machine is in good order, on turning the cylinder, its motion will be accompanied by a crackling noise, and, if the room be darkened, flashes of pale white light will be seen to issue from between the cylinder and the rubber, which passing underneath the silk flap, will illuminate the points on the side (or end) of the prime conductor.

To give proper effect to the machine, it is necessary that the negative conductor (that to which the rubber is attached) be made to communicate, by means of a small chain, with the wall or floor of the room; which being done, the electricity excited can only be received from the positive conductor; and it is in consequence called positive electricity. This will be shown by holding the knuckle near to the positive conductor, when brilliant sparks will pass from it in rapid succession, producing a sharp snapping sound, and causing in the hand a sensation of pain, greater in proportion to the space which the spark traverses. So long as the conditions remain as we have just described them, on presenting the knuckle to the negative conductor, no spark will be emitted by it; but if the chain by which it communicates with the floor be removed, and attached in a similar manner to the positive conductor, then will sparks pass between the knuckle and the negative conductor, and not from the other; and the electricity excited by the machine under these circumstances is called negative electricity.

We have already stated that an electrical machine is composed of two classes of materials, called, in reference to their electrical habits, or properties, non-conductors and conductors. Thus, by the judicious combination of dried wood, glass, hair, and silk, which belong to the first-mentioned class of bodies, and of brass, or some other metal, belonging to the second class, we are enabled to excite electricity in any required quantity, detaching it for a time from substances with which it was previously united, and compelling it to enter others in such quantities as to produce effects, which, under ordinary circumstances, and without such powerful agency, we have no opportunities of witnessing.

The source of electricity, as obtained by the machine, is the glass cylinder, the materials composing the rubber, and the amalgam interposed between it and the cylinder. But although the glass and the rubber are what are termed electrics, and, consequently, very susceptible of electrical excitation, it would be impossible to obtain by them electricity in any considerable quantity, or to have it at all under control, if the conductors, as well as the other parts of the machine just referred to, were not *insulated*, that is, detached, in an electrical sense, from the floor, and all surrounding substances. This object is

effected by means of the glass pillars which support the cylinder and conductors, and the necessity for which will be seen in a moment on attaching a chain to both conductors, thus making them communicate with the floor. In that case the electricity excited by the friction of the cylinder against the rubber will pass from the negative to the positive conductor, and thence down the chain to the floor, so that it will be impossible to obtain the slightest indication of its presence. The same will happen if we connect the two conductors, by a chain or wire, without letting it touch the stand of the machine; the electricity then passing from the negative to the positive conductor, and back from the positive to the negative, in an uninterrupted circuit, so long as the rotation of the cylinder continues.

But whilst the efficiency of an electrical machine is destroyed by connecting *both* conductors with the floor, or with each other, it is necessary that *one* of them should be in communication either with the floor or the walls; and as it is more convenient to operate with the positive than with the negative conductor, the latter most commonly has a chain attached to it, as already described. The use of this chain is to keep up a supply of electricity to the rubber, for without it, after turning the cylinder for a few minutes, the machine would become almost inactive, in consequence of the electricity of the rubber being exhausted. It is true that electricity is always present in the atmosphere, sometimes in greater proportions than at others; but as air is a very slow conductor, excepting when it is heavily charged with moisture, the supply from thence would be inadequate and uncertain. From the earth electricity may be obtained in any required quantity, at all times, and in all places.

Before we proceed further, it may be as well to enter a little more into detail respecting positive and negative electricity. We have shown that when glass and silk, or sealing-wax and woollen cloth, are rubbed against each other, electrical excitation ensues; that produced by the friction of the two former being called positive, that of the two latter, negative, electricity. We have also stated that on holding an excited glass rod near to a feather, or other light substance, placed under favourable circumstances, the latter is first attracted and then repelled. The same happens when excited sealing-wax is used in a similar manner. If, however, the excited glass and wax are alternately brought near the feather, it will be found that when repelled by the glass, it is invariably attracted by the wax, and when repelled by the wax, it is with equal certainty attracted by the glass. Hence we learn that whenever the electricity excited upon glass is communicated to some other substance, that substance immediately exhibits a repulsive habit in reference to all others similarly electrified; whilst with equal energy, but of an opposite kind, it attracts substances in a quiescent state, as it does also those imbued with electricity produced by the friction of wax.

In every instance of electrical excitation two or more substances are necessarily concerned; and it is important to remember that the rate (or amount) of disturbance in the electrical relations of bodies, is equally great in what is termed the *exciting* body, as it is in that *excited*; nor is it possible, under any circumstances, to produce one state (or kind) of electricity, without producing by the same means, at the same time, and to the same extent, the other. Thus, by rubbing a rod of glass with a silk handkerchief, the glass becomes positively, and the silk negatively, electrified. Adopt a similar process with red sealing-wax and woollen cloth, the wax will be negatively and the cloth positively, electrified.

It is difficult to define the precise meaning of the terms *positive* and *negative*, as applied to electrical phenomena. Some maintain that there are two distinct kinds of electricity. Others contend that there is only one kind, which exists in opposite states. According to the latter theory, electrical excitation is supposed to depend on certain properties of bodies, which admit of the accumulation of electricity among the particles of one class, and the separation of it from those of another class. Hence when, by contact, by friction, or by some other means, electricity is excited, that body which has received more than its ordinary share, is said to be positively electrified, and that which has been deprived of a portion of what it previously contained, and consequently has less than its ordinary share, is said to be negatively electrified. Without entering at length upon this subject, we remark that our chief business is to investigate, and endeavour to understand the *facts* of the science. In pursuing a series of illustrative experiments, it matters not which *theory* is most correct, provided our *practice* is conformable to well-ascertained principles. Whether there be two kinds, or two states, of electricity, we must ever bear in mind that bodies similarly electrified always repel, those dissimilarly electrified always attract, each other; that both kinds, or states, of electricity, are produced simultaneously, and in equal proportions; and that the electricity we intend to operate with can be subjected to our control only by means of an insulated or non-conducting substance.

In the cylindrical machine the rubber is always negative, the cylinder always positive; the hair with which the rubber is made, and the silk flap attached to it, answering precisely the same purpose in reference to the cylinder, as a silk handkerchief does in reference to a glass rod. By the insulation of the negative conductor we are enabled to operate, if we wish to do so, with negative electricity; but if there be only one kind of electricity, that which appears to proceed *from* the negative conductor must in reality be passing *towards* it. Excepting for the sake of illustrating a few matters connected with the elements of electrical science, there is no necessity for a negative conductor. The plate machine for general purposes is more convenient, more easily excited, and with the same amount of labour yields a greater quantity of electricity than the cylindrical machine. In the plate machine, as it is commonly made, the only part requiring to be insulated is the conductor. The electrical relations of the rubbers and the plate are the same as we have just described; but although we know the rubbers are charged with negative electricity, we have no means of exhibiting its effects separately. The rubbers of the plate machine being in contact with the frame of the machine, they of course communicate directly with the floor. In this respect they resemble the rubber of the cylindrical machine when a chain is attached to the negative conductor. It will therefore be seen that the action of both machines is exactly alike when positive electricity is required from them.

He that wants good sense is unhappy in having learning, for he has thereby only more ways of exposing himself; and he that has sense, knows that learning is not knowledge, but rather the art of using it.—Tatler.

Though every old man has been young, and every young one hopes to be old, there seems to be a most unnatural misunderstanding between those stages of life. This unhappy want of commerce arises from the insolent arrogance or exultation in youth, and the irrational despondence or self-pity in age.—Steele.

ON THE ESTABLISHMENT OF NIGHT GUARDS, OR WATCHMEN.

In proportion as a town increases in population and wealth, we naturally acknowledge the necessity for making some provision for the protection of persons and property, at those hours when the inhabitants are least able to protect themselves. Consequently, we find that from the earliest establishment of municipal bodies, arrangements, more or less judicious, have been made for the establishment of a system of night-guard or watching.

There are several allusions to watchmen in the Song of Solomon and in the Psalms, which show that the Jews had such guards in their towns. At Athens, sentinels were posted at different parts during the night; and overlookers went round at intervals, to see that they were at their posts: the overlookers used to ring a bell, which the sentinels were obliged to answer. There were at Rome, under the names of *Triumviri nocturni*, *Cohortes vigilium*, &c., men who guarded the streets during the night, as well to give alarm in case of fire, as to keep depredators in awe.

The custom of causing the watchmen to call out the hours during the night, seems to have sprung up in Germany, after the erection of walled cities and towns. In the feudal and baronial ages, towns were often surprised by hostile troops in the night; and to lessen the liability of being so taken unawares, watchmen or sentinels were placed, generally on elevated positions. The custom of calling out the hour was probably established with the view to furnish some test, by which the inhabitants might know that the watchmen were vigilant and at their posts. With regard to the earlier cities, such as Rome, even if they had watchmen, it was not so easy for them to announce the hours during the night. Clocks and watches were not then invented, and sun-dials could only be used during the continuance (and that unclouded) of the sun above the horizon. During the day, the inhabitants could know the hour by means of public *clepsydræ* or water-clocks, which were kept in open buildings in various parts of Rome. These water-clocks indicated the time by the trickling of water through a small orifice; but as they were not likely to be visited by the inhabitants during the night, it does not appear that there was any means of knowing the hour at those times. When, however, the walled towns of Germany and the Low Countries came into note, the night-watchmen, in addition to their more important duty, announced the hour.

A nightly guard was established at Paris so early as the year 595. The citizens were obliged to keep watch in turns, under the command of a *Miles Gueti*, who was also called *Chevalier*. From this inconvenient duty the inhabitants frequently freed themselves by paying a sum of money; until, at length, a body of night-guards was established.

A traveller in the East, in the last century, speaks of a curious mode of night-watching in Japan. The watchmen used to have ropes with knots tied in them at intervals: the rope, when kindled, would burn or smoulder away slowly, and when it had burned to a knot, the watchman announced the hour, (or whatever other interval of time it might be,) by striking two flat boards together.

Montagne, speaking of the German towns about the end of the sixteenth century, says, "The watchmen went about the streets in the night time, not so much on account of thieves, as on account of fires and other alarms. When the clocks struck, the one was obliged to call out loud to the other, and to ask what it was o'clock, and then to wish him a good night." These watchmen had in some cases horns, and in others rattles; the former generally for villages, and the latter for towns. The rattles which the watchmen of London carried a few years ago, seem to have been of German origin, since a body called the *Ratelwache*, or rattle-guard, was established at Hamburg in 1671.

There appears to have been one species of watchmen which has never been introduced in England; that is, steeple or tower-watchmen. These were men who were posted in church steeples, or on high towers, and who had to blow their horns at the expiration of every hour. The custom prevailed in Germany in the sixteenth and seventeenth centuries. At first the inhabitants themselves had to fill this office by turns; but in process of time, a paid body of men, who were generally the town-pipers, or town-musicians, relieved them from this duty. A police order was made at Berlin in 1580, by which the steeple-watchmen were allowed to attend at weddings with music, for the accustomed pay, but only till the hour of nine at night, in order that they might then blow their horns on the steeples, and commence their nightly watch. In some German towns the regulations were so strict, that the steeple-watchman had a room built for him in or near the steeple of the church, from which he was not permitted to descend.

Most of our readers are familiar with the custom of Christmas "waits," playing music and calling out the hour on several consecutive nights preceding Christmas-day. These waits were originally a sort of watchmen in the court-yards of the palaces of the nobility, some centuries back; and Rymer gives the following curious account of the pay and privileges of the waits in the king's court, in the reign of Edward the Fourth.

A Wayte, that nightelye from Mychelmas to Shreve Thorsdaye pipethe the watche within this courte fower tymes; in the somere nyghtes iij tymes, and makethe bon gayte at everie chambere-doare, and office, as well for feare of pyckeres and pillers. He cateth in the halle with mynstrielles, and takethe lyverey at nyght a loffe, a galone of alle, and for somere nightes ij candles pich, a bushel of coles; and for wintere nightes half a loafe of bread, a galone of alle, iiij candles piche, a bushel of coles; daylye whilst he is presente in courte for wages in cheque roale allowed iiij*d.* or else iij by the discresshon of the steuarde and tressorere; and that, aftere his cominge and diseruinge; also cloathinge with the household yeomen or mynstrielles lyke to the wages that he takethe; and he be syke he taketh twoe loves, ij messe of great meate one galone of alle. Also he partethe with the householde of general gyfts, and hathe his beddinge carried by the comptrollers assygment; and under this yeoman to be a groome watere. If he can excuse the yeoman in his absence, then he takethe rewarde, clothinge, meate, and all other things lyke to other grooms of houshold. Also this yeoman-wayghte, at the makinge of knightes of the bathe, for his attendence upon them by nyghte tyme in watchinge in the chapelle, hathe to his fee all the watchinge-clothinge that the knighte shall wear uppon him.

Thus, we find, that these waits were a kind of minstrel-watchmen attached to the establishments of the great. In later times, when baronial customs were on the decline, the waits emerged from the court-yards, and perambulated the streets,—became, in fact, tradesmen on their own account, instead of being retainers of great families. At present they have entirely lost the character of watchmen, although, in the intervals of their tunes, they still continue to call the hour.

Permanent watchmen, however, gradually became introduced into England. These watchmen, as most persons will remember, were appointed, paid, and regulated, either by the corporation of the town in which they served, or by the authorities of the dif-

ferent parishes in those towns, each parish regulating its own watchmen. The old watch-boxes have left their impression on the mind, as little domiciles in which the watchmen rested—and perchance slept—at intervals between going their rounds. A material and judicious alteration, the nature of which we need not particularly describe, has been made, within a few years, in the night-guarding of the public streets, by the establishment of the Metropolitan Police.

The regulation of the police in Paris and other French towns, whether for day or night watch, savours more of military discipline than anything of the kind which we have in England: the system of espionage is, indeed, so strict, that it is doubtful whether it would suit the notions and habits of our countrymen. We should be apt to think it an interference with private rights, if the owner of an hotel had to render up to the police a list of the names, professions, &c., of all the persons who might come to take up their abode, even for a single night, in their houses: yet such is the case in Paris.

MONDAY'S EXPENSES.

In many of our villages, in all our manufacturing towns, and more especially in the overgrown metropolis of London, the grand emporium of the world, a great number of workmen, of all descriptions, follow the baneful habit of making a holiday, as it is falsely termed, on Monday, for the purpose, not of being surrounded by their wives and families, and assisting their labours, but of wasting in a public-house those hours which would have been much better, and more profitably employed in their workshops. It is even not a rare occurrence to observe those unfortunate beings who take also the Tuesday, nay even in some instances the Wednesday, for the same hateful occupation. Independent of the habits of idleness and of debauchery which they necessarily contract in such scenes and occupations, they invariably ruin their health, enervate their strength, and bring on premature old age. Nor do the direful effects stop here; for should a panic happen, or a stagnation of trade arise, from any of those innumerable causes which from time to time agitate the commercial world, so as to compel the great manufacturers, or wholesale houses, to lower their establishments, those holiday-making workmen would be among the first that would be removed from their situations, and refused employment; and they would have only themselves to accuse for all the misery which they would thus have brought upon themselves and upon their families.

But there is another consideration, merely matter of computation, which ought never to be lost sight of. If we estimate the day's work of a mechanic or workman at three shillings, and what he spends during his day's holiday-making every Monday at two shillings, which is certainly not exaggerating the facts in the generality of instances, it is clear that he who *only* throws away the Monday, will be out of pocket at the end of the week five shillings, besides what may be lost by other means, or by the rules of the establishment to which he belongs. In many instances must also be added the loss of situation and character, or at any rate the smaller gains of the Tuesday, as few men are capable of working properly the day after a debauch. Now as there are fifty-two weeks in a year, it follows that such a workman loses in the course of the year *two hundred and sixty shillings* as his *mere expenses of the Monday*, independent of those of his family. If, however, instead of dissipating the Monday, he, like the more provident and wiser workman, prudently placed this sum of money in the neighbouring Savings' Bank, he would assure to himself that certain resource for his old age, without which he will only fall into misery and regret, and his gray hairs go down with sorrow to the grave. A person who abstains from those useless Monday holidays, and carries to the Savings' Bank every week that sum of money, which otherwise would have been lost, as before shown, will, at the end of only seven years, have accumulated no less a sum than one hundred pounds.

May the workmen and mechanics who read this reflect seriously upon what has been stated; and for the future, if they have not already, adopt habits of regularity and economy, without which it is impossible for them to continue respected, comfortable, or happy. May they remember, and avail themselves of the advantages offered by the Savings' Banks of the kingdom; "for," to use the words of a well-known address, "these banks receive just what each person can spare, and when and as long as he can spare it—a shilling or a pound more or less, weekly or monthly, or quarterly, or now and then, just as it happens." There at all times the fruits of industry may be safely housed, and what is more, while there they remain, they are certain to be on the increase. If it please God to spare a person's life, he will go on increasing his store and his respectability. In health and in sickness he will have no wants but what his own funds can supply. Secure from distress himself, he may be able to relieve (as not unfrequently happens) the distress of a relation or friend; and when he dies, will leave his little property to his children, or other relatives, and his good example with it. The present great advantages derived from Savings' Banks in this country may be partially estimated from the fact of considerably more than the enormous sum of twenty millions of money being invested in them. To the manifold benefits arising from them to families of the labouring classes the writer of this can fully testify, having frequently heard them admitted by the parties, with tears of joy in their eyes. F. I. F.

Religion has been sometimes decried as the passion of weak men, women, and children. Woman may blush for the association which the ridicule involves, but she has no reason to be ashamed of her propensity. May it ever be her distinction! It is the heart which adorns as well as enriches.—Mrs. John Sanford.

Those disasters which break down the spirit of a man, and prostrate him in the dust, seem to call forth all the energies of the softer sex, and give such intrepidity and elevation to their character, that at times it approaches to sublimity. Nothing can be more touching than to behold a soft and tender female, who had been all weakness and dependance, and alive to every trivial roughness, while treading the prosperous paths of life, suddenly rising in mental force to be the comforter and supporter of her husband under misfortune, and abiding, with unshrinking firmness, the bitterest blasts of adversity. As the vine which has long twined its graceful foliage about the oak, and been lifted by it in sunshine, will, when the hardy plant is rifted by the thunder-bolt, cling round it with its caressing tendrils, and bind up its shattered boughs; so is it beautifully ordered by Providence, that woman, who is the mere dependant and ornament of man in his happier hours, should be his stay and solace when smitten with sudden calamity; winding herself into the rugged recesses of his nature, tenderly supporting the drooping head, and binding up the broken heart. I was once congratulating a friend, who had around him a blooming family, knit together in the strongest affection. "I can wish you no better lot," said he, with enthusiasm, "than to have a wife and children: if you are prosperous, there they are to share your prosperity; if otherwise, there they are to comfort you."—?

THE BLACK RAT.

The Black Rat, although at present nearly extinct, was originally the common species in this country. The Brown Rat, with which we are so well acquainted, is said to have made its first appearance in England about the middle of the sixteenth century, but authors are undecided as to the country from which it was brought; since its introduction it has rapidly increased, and its black kinsman is rarely met with.

This increase of one, and disappearance of another, species, may be partly attributed to the greater size of the Brown Rat, who, in the wars that take place in times of famine, generally comes off victorious. The principal haunts of the Black Rat at present are in old houses, in large cities, such as London and Edinburgh, where sometimes considerable numbers exist. "It forms its runs between the walls of houses, and under the stone and brick flooring of cellars, coming forth in the night in search of food."

Although (says Mr. Bell) their disposition appears to be naturally exceedingly ferocious, there are instances on record of their evincing considerable attachment, not only to each other, but to mankind. Mr. Jesse, in his usually amusing and pleasant style, gives us an anecdote, which the respectable authority from which he derived it forbids us to doubt, exhibiting a degree of tenderness and care towards the disabled and aged members of their community, which were it imitated by Christian men, would either render our Poor-laws unnecessary, or remove the disgrace and opprobrium which their mal-administration too often causes to attach to them. His informant, the Rev. Mr. Ferryman, walking out in some meadows one evening, "observed a great number of Rats in the act of migrating from one place to another, which it is known they are in the habit of doing occasionally. He stood perfectly still, and the whole assemblage passed close to him. His astonishment, however, was great, when he observed an old blind Rat, which held a piece of stick at one end in his mouth, while another Rat had hold of the other end of it, and thus conducted his blind companion."

The name given to this Rat by the Welsh, signifying "French Mouse," renders it probable that, whatever may be its native country, it was introduced here from the French coast. From Europe it has been sent with the Brown Rat to America, the islands of the Pacific, and many other places, in some of which it has become already a serious inconvenience.

The tail of the Rat is very singular in its formation; it is covered with the appearance of small scales arranged in rings, between which stiff hairs appear, but too few in number to hide the scales from the eye. The food of the Rat is various, although, when it can obtain vegetable substances, such as grain and roots, it seems to prefer them to animal nourishment. Habit, however, frequently renders the Rats more decidedly carnivorous, and they become greedy devourers of putrefied substances, assembling in large numbers in drains and slaughter-houses.

Although the Black Rat is so well known in Europe at the present time, it is the opinion of many authors that the ancients were ignorant of its existence; from this it is inferred that its original country is America, from whence it was imported into Europe by the vessels that trade between the two continents; but when this first occurred is uncertain.

The Black Rat is still well known in the rural districts of France, where it is a complete scourge to the farmer, from the damage it commits, by gnawing linen, woollen goods, leather, harness, and fat substances of every description; in fact, almost everything that falls in its way. It is particularly fond of hog's-lard, and this substance is frequently employed as a bait in the traps which are set for its destruction.

A method of taking Rats was some years back resorted to with great success; it consisted in employing a simple wooden trap, with a door like a portcullis, capable of closing one end, the other end being left open. At first the door was propped up so as to prevent its falling, and malt slightly perfumed with oil of aniseed was spread near to the trap and inside of it, the Rats being attracted by the scent to feed on the malt; fresh supplies were laid down every morning, till by degrees, becoming more confident, all the Rats on the premises resorted to the trap to partake of their savoury meal. When the animals had acquired perfect confidence, say in a week or ten days, the prop supporting the door was removed, and it was so contrived that it could be let down in an instant; a bag rubbed with the oil of aniseed was also tied on to the open end, and the Rats coming to their usual meal would soon fill the trap; the door was then let down quickly but gently, and the trap with its prisoners removed. The Rats it contained were shaken into the bag, and a string being drawn round it to close its opening, it was detached from the trap and the Rats destroyed, taking especial care that not one escaped; a fresh bag was then tied to the trap, which was replaced in its original position, and another party of prisoners captured. In this manner, if proper precautions are used, nearly all the Rats in the neighbourhood can be taken.

If we hope to instruct others, we should familiarize our own minds to some fixed and determinate principles of action. The world is a vast labyrinth, in which almost every one is running a different way, and almost every one manifesting hatred to those who do not run the same way. A few indeed stand motionless, and not seeking to lead themselves or others out of the maze, laugh at the failures of their brethren, yet with little reason; for more grossly than the most bewildered wanderer does *he* err, who never aims to go right. It is more honourable to the head, as well as to the heart, to be misled by our eagerness in the pursuit of truth, than to be safe from blundering by contempt of it. The happiness of mankind is the *end* of virtue, and truth is the knowledge of the *means;* which he will never seriously attempt to discover who has not habitually interested himself *in the welfare of others.* The searcher after truth must love and be beloved; for general benevolence is a necessary motive to constancy of pursuit; and this general benevolence is begotten and rendered permanent by social and domestic affections. Let us beware of that proud philosophy which affects to inculcate philanthrophy while it denounces every home-born feeling by which it is produced and nurtured. The paternal and filial duties discipline the heart, and prepare it for the love of all mankind. The intensity of private attachments encourages, not prevents, universal benevolence. The nearer we approach the sun, the more intense his heat: yet what corner of the system does he not cheer and vivify?—S. T. Coleridge.

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THE WYE AND MONMOUTHSHIRE. No. VI.

VIEW OF LLANDOGO, ON THE WYE.

KYMIN—BUCKSTONE—TRELECK—TROY HOUSE—PENALT—REDBROOK—BIGSWEIR—ST. BRIAVEL'S—LLANDOGO—BROCKWEIR.

THE walks in the vicinity of Monmouth, as may be supposed, are infinitely varied and delightful. Chippenham Mead, on which the races are held, is a favourite evening resort of the inhabitants; but the stranger must climb the surrounding eminences. Perhaps the finest view of the town is obtained from a spot distinguished by a group of trees near the foot of the ascent to the Kymin, and not far from the entrance to Beaulieu Wood, above the road to Coleford. If the lights are good, the combination of the lofty spire, castle, and picturesque buildings of the town, undisfigured by smoke, the massive bridge thrown into deep shadow above the broad and rapid Wye, which sparkles with a life-like effect, with the romantic features of the surrounding scenery, form a picture scarcely equalled in its way in the island. From the summit of the hill on the road to Chepstow, is another splendid prospect, embracing not only the adjacent vale and town, but a sublime view of the lofty Sugar Loaf, Blorenge, Skyrrid, and Black Mountains, with the mild blue hills of Cambria skirting the horizon still further to the north and "far west." The high conical hill called the Kymin, which rises abruptly from the banks of the river, opposite the town, is worth visiting. A pleasant walk has been formed to the summit, which is partly crowned with the very extensive wood called Beaulieu Grove, from whence there is a view extending (the topographers say, but this we will not vouch for) to the amazing circumference of nearly three hundred miles. The course of the Wye from New Weir to Monmouth is seen to great advantage, and the prospect is of great magnificence. On the centre of this eminence, a monument in the form of an embattled tower has been erected by subscription, to commemorate the glorious victories of the immortal Nelson and our other naval heroes. It is fitted up for the accommodation of visiters, and the frieze which surrounds it is ornamented with medallions of the most eminent British admirals, accompanied with emblematic and appropriate devices. It is, however, now going to decay. The tourist must ascend from this eminence to the *Buckstone*, which stands on a hill about 1000 feet high, commanding the finest view in the lower Wye tour, with the exception of the Wyndcliff, and, perhaps, Cymon's Yatt. The distance from Monmouth by the new road to Coleford, is about three miles. The Buckstone is a famous Logan or rocking-stone of the Druids, and in form resembles an irregular pyramid inverted, and standing upon its apex; its circumference at the upper part, is about fifty-four feet, but the point where it touches the pedestal is not above two feet square. On the

summit is a rock-basin, supposed to have been used for libations, or other ceremonies connected with the Celtic superstitions. Upon the eastern corner of the stone is a rude arch, now almost obliterated from the effects of time and the weather, which is supposed by Borlase to have been the *sacellum*, or chapel, where the Druid of the stone placed himself during the sacred rites of divination, or for the purpose of giving oracular answers. This hill was no doubt a grand station of the Druids, whence they communicated by beacons for great distances. In a clear day the prospect is of immense extent, and sweeps the horizon on almost every side. The Monmouthshire and Welsh mountains as far as the Brecon Beacons, (the highest point in South Wales,) Herefordshire, the Malvern Hills, the wide expanse of the Forest of Dean, the Treleck mountains, and a graceful view towards Tintern and the Wyndcliff, with glimpses of the Cotswolds, and in other counties, are all to be seen from this celebrated spot. Immediately below is what we may term a sea of wood—one of the finest parts of Dean Forest. We have visited the Buckstone frequently, and always discovered new beauties. Wood, water, mountain, and precipice, are grouped and blended together in the "true superb of the picturesque." Another very interesting excursion may be made from Monmouth up the Treleck Hill, which commands decidedly the finest views of the mountains to the north and west, to the village of Treleck, (six miles,) an ancient British station, where there are some curious Celtic remains. Three huge stones standing in a field near the church, (which is worth inspection,) are sometimes called Harold's stones. There is also a large tumulus encircled by a moat, supposed to be of Druidical origin.

Return we now to the "very delight of the eyes and seat of pleasure," as the poet Gray terms Monmouth, and let us wend our way down the placid Wye to the ruins of "Holy Tinterne." The prevailing features as we progress onwards are lofty wooded banks, which often hem the stream closely; but we prefer that portion of the scenery above Monmouth, where the banks of the river are more open, and consequently afford a wider range of landscape for the eye to dwell upon. Gilpin, in speaking of the beauties of river scenery, says, "that sometimes they should come running up to the foreground; then hide themselves behind woody precipices; then again, when we know not what has become of them, appear in the distances, forming their meanders along some winding vale."

Troy House, about a mile to the south-east of Monmouth, on the banks of a little trout stream called the Trothy, from whence it derives its name, is chiefly worthy of notice on account of several antiquities being preserved there. Amongst others may be mentioned the bed which is assigned by tradition as the one in which Henry V. was born; his cradle, and the armour which he is said to have worn at Agincourt. There is also a curious carved oak chimney-piece, brought from Ragland Castle. The house, which was the work of Inigo Jones, contains some fine apartments, adorned with portraits of the noble house of Beaufort, into whose hands it originally came from the Herbert family. The present Duke of Beaufort occasionally visits it in the Autumn.

About half a mile further on, "the Wye," to use the words of Nicholson, "makes a grand sweep to the right, and assumes a new character. Dismissing its rocks and precipices, it rolls through lofty sloping hills, thickly covered with waving woods. All is here solemn, still, and agreeable." Penalt church, and the interesting little church at Michel Troy, both on the right bank of the river, with the curious cross in its pretty church-yard, are worthy attention, if time is not an object. The former is situate on the side of a woody eminence. On an extensive common behind there is a large oak, with a stone seat at its foot. A singular custom was formerly observed at this spot: when a funeral passed by, the corpse was placed on this stone, and the company sang a psalm; being an evident continuation of the *oak* and *stones* of Druidism, and Celtic customs altered into a Christian form.

Passing by Upper and Lower Redbrook, on the left bank, the little stream which forms the boundary between the counties of Monmouth and Gloucester, here falls into the Wye, turning the wheels of several iron and tin-works. At Whitebrook are some paper-mills, which stand on the site of the old iron-works, and a little below, a lofty eminence, called Pen-y-van Hill, appears on the right. Between Pen-y-van and the river are the ruins of the ancient manor-house of Pilstone, which are now partly converted into a farm. Crossing the Wye over a modern and somewhat handsome iron bridge, we come to Bigsweir House, (now we believe untenanted,) beautifully situate amidst hills luxuriantly clothed with wood. The house stands on a gentle eminence, which gradually rises into a lofty hill called Hud-knolls, on the summit of which, in a bleak uninteresting country, are the venerable remains of St. Briavel's Castle. This ancient fortress stands on the confines of Dean Forest, and was originally founded by Milo, earl of Hereford, in the reign of Henry the First, for the residence of the Lords Warden of the English and Welsh marches, and as a check to Cambrian incursions. It has been in a state of decay for centuries, and though "patched and cobbled like a worn-out shoe," it is still sufficiently in repair to serve the purposes of a prison for debtors and delinquents in the Forest.

At Bigsweir, an intelligent writer makes the following remark:—

> The voyager will lose one interesting feature almost peculiar to the Wye; we allude to the numerous weirs which obstruct its navigation when the tide is out; at high water the tide flows over them and makes the river appear perfectly level.

The river is also straitened in many places by projecting rocks and shelves, in some instances extending nearly across the stream; these produce a constant succession of rapids and eddying falls, which continue beyond Bigsweir, where the current is very strong.

From hence a long reach leads us to Llandogo, situated on the right bank of the river about seven miles from Monmouth. Tiddenham Hill rises prominently in the foreground of this sweet village, which consists of numerous dwellings studded along the side of a steep and lofty eminence, mantled with thick and picturesque woods. Nearly in the centre of the hill is a deep ravine, called "Cleddon Shoots," down which in the *Winter* there is a beautiful cascade. A pretty view of the river, which forms a smooth bay, with the extensive tract of woodland called Hud-knolls nearly opposite, may here be obtained. The Wye now becomes subject to the influence of the tide, and its hitherto crystal and translucid wave is sullied with the turbid waters of the Severn Sea. Coedithelweir is a large fall of water beneath Hud-knolls wood. On the left bank, about half a mile lower down, is the populous little hamlet of Brock-weir, where there is a mart for the reception of goods, chiefly corn, hoops, and fagots, which are brought down the Wye, and here shipped on board vessels of from thirty to eighty tons and upwards, for Bristol

and other places. Brockweir is about nine miles distant from Monmouth, and nearly the same distance from Chepstow. A great many vessels, some of considerable burden, have been built here, and one or two are always to be seen on the stocks.

The river now meanders to Tintern, fringed on the one side with thick woods, and on the other some rich meadows terminate at the village of Tintern Parva. On rounding the point at Lyn-weir, the church of Tintern, close to the edge of the river, wears a singular and picturesque aspect. Another turn discloses the ruins of the once magnificent Abbey Church, a description of which we must reserve for another paper. Here we pause.

THE INTRODUCTION OF STONE PAVEMENTS IN PUBLIC STREETS.

One of the most prominent and marked symbols of advancing civilization or enterprise in a nation, or in any of its cities, is when attention is paid to its public roads and thoroughfares. If communication and traffic between the inhabitants of different places be, as the experience of many countries has shown it to be, a sure and advancing step in social improvement, it is obvious that attention to the roads, paths, or streets leading from one place to another, becomes an essential element in the progress of that communication. If proof of this were required, the astonishing capital invested in stage-coaches, steam-vessels, canals, and railroads, in our own country, would afford ample proof.

In early times the attention to roads and streets was very fitful and uncertain. It is probable that the first attempts at paving, in the ancient cities, were effected by the wealthier inhabitants, who paved those parts of the streets immediately before their own houses; it was, therefore, optional and uncertain.

In the eastern nations, although the cities were built with great regard to luxury and magnificence, yet attention was not so necessary to the condition of the streets, since the almost utter absence of snow and ice, and the confinement of rain to a particular season of the year, rendered the earth, or gravelly paving, of the streets less liable to that process of destruction, which similar roads would experience in the more humid cities of Europe.

The most commercial cities were the first to adopt the practice of paving public streets. It was from Carthage that the Romans acquired their first idea of its importance, and the city of Rome became paved by degrees. It is related by Josephus, that the Jews proposed to Agrippa, after the building of the Temple was finished, to employ the workmen who had been discharged from building the Temple, to pave the streets of Jerusalem; and it is recorded in the Talmud, that the streets of Jerusalem were swept every day

The remains of Herculaneum show that the streets of that city were paved with lava, having a raised path on each side for foot-passengers.

The government of the Saracens, or Moors, in Spain, during the middle ages, was marked by many enlightened and valuable improvements, in matters connected both with the mental culture of the inhabitants and with the advancement of commerce; and this, too, at a time when the rest of Europe was plunged into a state but little removed from barbarism. Among these improvements was the paving of the city of Cordova, so early as the year 850, by Abderrahman the Second, the fourth Spanish caliph.

The first introduction of pavements into Paris is said to have originated in the following circumstance, as related by Regord, physician to Philip the Second. The king was one day standing at one of the windows in his palace, on the banks of the Seine, when he was so annoyed by the sight and odour of the dust and rubbish in the streets, that he gave orders to have them paved with stone at his own expense. This occurred in the year 1184; and in the accounts of Gerard de Poissy, intendant of finances, it appears that 11,000 marks of silver were paid for this object.

The marked improvement presented by the streets of Paris stimulated the authorities of other cities to follow the example. In 1391 Dijon was paved, Charles the Bold, Duke of Burgundy, contributing 2000 livres towards the undertaking. By the year 1424 the whole of the streets were paved, and one favourable result was, that the health of the inhabitants was not so liable as before to be affected by contagious disorders.

It does not appear that London was paved in the eleventh century, if we may judge from the details of an accident which is said to have occurred in 1090. Bow Church, in Cheapside, was unroofed by a storm of wind, and four beams, which formed part of the roof, were precipitated to the ground, and penetrated the soft miry soil of the street to such a depth, that only four feet of the length was visible above ground, although the entire length of the beams was twenty-six feet. A royal command was issued in 1417, which stated, that "the highway called Old Bourne was so deep and miry, that many perils and hazards were thereby occasioned to the king's carriages passing that way, and to those of his subjects;" he, therefore, ordered two vessels, of twenty tons each, to be employed, at his expense, in bringing stones to pave the streets. Smithfield appears to have been first paved about 1614.

The origin of paving in the city of Augsburg, in Germany, may be taken as a type of what occurred in other towns and cities. Hans Gwerlich, a rich merchant, caused a neat foot-path to be laid before his house in 1415; this gained so much approval from the inhabitants, that the government shortly afterwards paved the whole city.

The paving of a street is obviously not the only thing necessary to the preservation of cleanliness; the accumulation of rubbish on the stone paving being a sure means of giving the streets of a town a dirty appearance. Accordingly we find that many squabbles took place between the inhabitants and the town authorities, respecting the cleansing of the streets. This was particularly observable in Paris. After the city was paved, each inhabitant was ordered to keep clean the pavement opposite his own house; but this order was so frequently evaded, that in the fourteenth century the streets became choked up with rubbish. In 1348 a law was passed to make the order more peremptory, and in 1388 the enforcement of the law was rendered more rigorous by heavy penalties. The inhabitants hereupon clubbed together in small parties, for the hire of men and carts to remove the rubbish. But still the order was neglected by the nobles, who conceived that they ought to be exempt from such a duty; the consequence was that many of the public squares, or "places," still remained receptacles for rubbish of all kinds. A subsequent law made it incumbent on all to perform this public duty; but at last, the government adopted the only efficient means of insuring the proper performance of the necessary cleansing of the streets, by making it a national undertaking; they contracted with certain parties to cleanse the streets at a certain sum per annum,—the amount first devoted to this purpose being 70,000 livres per annum.

Sauval, in his *History of Paris*, relates a circumstance which occurred in that city, considerably earlier than the events which we have just detailed, and which is at once characteristic of the dirty state of the streets, and of the power of the ecclesiastics at that period. King Philip was passing St. Gervais on horseback, on the 2nd of October, 1181, when a sow ran against his horse's legs, made him stumble, and threw the king to the ground with so much violence that he died the next morning. On account of this accident an order was issued, that no swine should be suffered in future to run about the streets; but this was opposed by the abbot of St. Anthony, on this ground, that it was contrary to the respect due to their patron saint, to prevent his swine from enjoying the liberty of going where they thought proper. It was found necessary, therefore, to grant the clergy an exclusive privilege, and to allow their swine, provided they had bells to their necks, to promenade in the dirt of the streets without molestation.

In many of the continental cities, as it was found almost impossible to compel the inhabitants to clean that portion of the paving which was opposite their own doors, the irksome office was shifted on to the shoulders of persons who were generally held as being of mean condition; sometimes the skinners had this tax imposed upon them, at other times the servants of the public executioner had to bear the burden, and in many instances, this office was added to the number of the indignities which were so liberally heaped on the Jews in those days. But perhaps the oddest mode of causing the streets to be cleansed was that adopted at Berlin in 1671, when it was ordered, that every countryman who brought goods into Berlin for sale at the public markets, should take away a load of rubbish on his back.

The gradual spread and improvement of the practice of paving the streets of populous cities, in our own day, are too familiar to every one to render a detailed notice of them necessary.

To be truly and really independent, is to support ourselves by our own exertions.—PORTER.

CONSCIENCE, like all other powers, comes to maturity by insensible degrees; and may be more aided in its strength and vigour, by proper culture.—REID.

SEVERAL species of phosphorescent lichens, especially "subcorticalis, subterranea, and phosphorea," are occasionally phosphorescent, and more or less luminous in the dark; and hence they often give to the cellars and mines in which they grow an extraordinary and brilliant appearance. In the coal-mines in the vicinity of Dresden, they are said to be so abundant and so luminous, as even to dazzle the eye by the brilliant light that they afford. This light is increased by the warmth of the mines; so that, hanging in festoons and pendent from the roof of the various excavations, twisting round the pillars, and covering the walls, they are said, by their brightness, to give to the Dresden coal-mines, in which they abound, the semblance of an enchanted palace. Mr. Erdman, the commissioner of mines, thus describes the appearance of the Rhizomorphæ in one he visited:—"I saw the luminous plants here in wonderful beauty; the impression produced by the spectacle I shall never forget. It appeared, on descending into the mine, as if we were entering an enchanted castle. The abundance of these plants was so great, that the roof, and the walls, and the pillars, were entirely covered with them, and the beautiful light they cast around almost dazzled the eye. The light they give out is like faint moonshine, so that two persons near each other could readily distinguish their bodies. The lights appear to be most considerable when the temperature of the mines is comparatively high."

RECREATIONS IN NATURAL PHILOSOPHY.

No. IX.

CENTRE OF GRAVITY (*continued*).

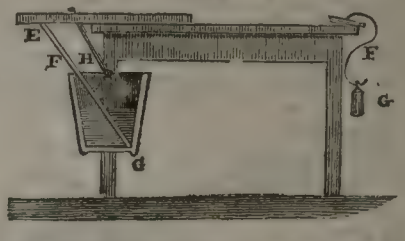
WHEN we have determined the exact spot where the centre of gravity is situated in any solid, a perpendicular line drawn from such centre, to the centre of the earth, is called the *line of direction*; and along this line every unsupported body endeavours to fall: if this line fall within the base of a body, such body will remain at rest; if otherwise it will fall.

This will explain to us why it is that a body stands firmly and steadily in proportion to the breadth of its base; and the difficulty of supporting a tall body upon its narrow base. It is not easy to balance a peg-top upon its peg; or a hoop upon its edge; while, on the contrary, the cone and the pyramid stand firm and immovable, since the line of direction falls within the middle of the base, and the centre of gravity in such bodies is necessarily low down near the base.

All the art of a rope-dancer consists in altering his centre of gravity upon every variation of the position of his body, so as to preserve the line of direction within the base. He is assisted in this by means of a long pole, the ends of which are loaded with lead; this pole he holds across the rope, and fixes his eyes steadily upon some object near the rope, so as to detect instantly the deviation of his centre of gravity to one side or the other. If this centre deviates for an instant to one side, he would be liable to fall off the rope on that side; but he preserves his position by lowering the end of the pole on the opposite side, and thus constantly maintains the line of direction within the very narrow base on which he stands. We frequently use our arms in the same manner as the rope-dancer uses his balancing pole. If we stumble with one foot, we extend the opposite arm. In walking along a very narrow ledge, we balance our bodies by means of our arms; a man carrying a pail of water has his centre of gravity thrown on one side by the weight of the pail; he, therefore, curves his body away from the pail, and extends the opposite arm, and thus maintains his centre of gravity in its proper position. A man carrying a sack of wheat on his back, leans forward, and thus prevents the weight from throwing the line of direction beyond the base behind him. Numerous other examples of a similar kind will readily occur to the intelligent reader: we now proceed to supply instances which are not so obvious.

In fig. 1, a weight G is attached to a bent wire F, and the latter is fixed at its upper extremity to a

Fig. 1.



piece of wood which rests at its edge upon the table. Now nothing more is necessary in order that the weight should fall to the ground, than that the small piece of wood should tilt over; but a careful attention to the figure will show, that in order to overturn the board, the weight G must rise towards the inner part of the table; and as almost the entire weight (and consequently the centre of gravity) of the whole, resides in the weight G, it is contrary to the law of gravitation for G to ascend, and as the board cannot

upset without raising the weight G, the whole may be made to swing to and fro without falling.

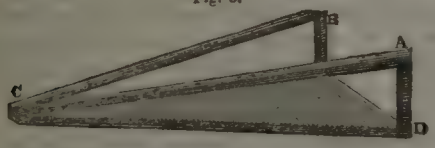
A similar fact is more strikingly shown by suspending a pail of water, as shown in another part of fig. 1. The pail G is supported by a string or handle H, which is secured to a board or stick, rather more than half of which rests upon the table. If the pail were allowed to hang with the handle upright, the whole assemblage would, of course, upset, since the greater part of the weight would be beyond the edge of the table, and the stick is not at all fixed to the table. But the whole acquires stability by merely placing a stick F in the position E G. The upper end is inserted into a notch in the stick at E, while the lower end presses against the pail, and forces the handle H out of the vertical position. Now no motion can be given to the pail without raising the centre of gravity of the whole arrangement, and such an elevation being contrary to the laws of gravity, the position of the pail is one of stable equilibrium, which a slight disturbance is not sufficient to destroy.

Figures 2 to 9 are additional illustrations of the truth that the centre of gravity always seeks the lowest point. They seem, at first view, to be exceptions to the law; for a body does not naturally roll uphill, as in the following cases, but we shall find that they are as perfect illustrations of the law as any that we have before given.

Fig. 2

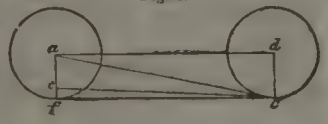
Figure 2, is a double cone of wood, which rolls up the inclined plane A B C D, fig. 3. The sharp edge formed by the two bases of the cones is placed at C, and the cones roll to A B:

Fig. 3.



but although they appear to move up the inclined plane, they actually move along a horizontal line, or down a line slightly inclined, as may be seen by inspecting figure 4, where *c e* is the line along which the cone moves; *c a* is the upward inclination of the bars of the frame, which deceive the eye in the effect produced. But *c f* is actually the path of the lowest part of the cone, and *d a* the path of the axis, both of which incline downwards.

Fig. 4.



In fig. 5, the cylinder, of which A K I is a section, if placed on an inclined plane C, it will roll down, because the centre of gravity not being supported in the line of direction H I D, it falls beyond the point of support F, and the line F A does not coincide with the line of direction.—But if the cylinder be not homogeneous; if it be formed partly of wood and partly of lead, as in figs. 6 and 7, where the shaded parts E F represent the lead, the centre of gravity is no longer the centre of magnitude of the mass but is on one side of it as at E. Now in fig. 7,

Fig. 5.

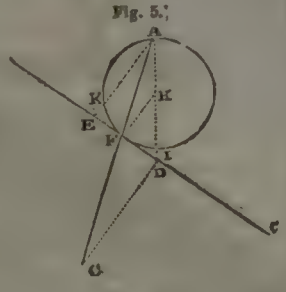
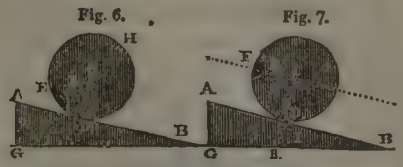


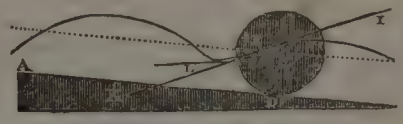
Fig. 6. Fig. 7.



the point of support is D, and a perpendicular from the centre of gravity E falls above the point of support, so that the cylinder rolls upwards until it falls to the position shown in fig. 6; such, that a perpendicular from the centre of gravity meets the point of contact D, when it will remain stationary, although on an inclined plane.

Fig. 8, is a further illustration of this interesting experiment. The dotted line is the path of the centre

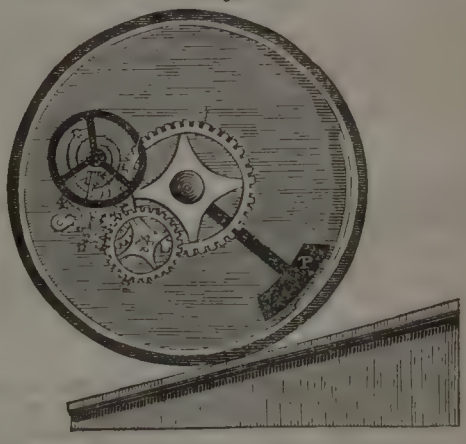
Fig. 8.



of magnitude of the cylinder up-hill; but the curved line is the path of the centre of gravity, so that it will readily be seen that the cylinder has a tendency to roll a short distance upwards, in order that the centre of gravity may assume the lowest possible position whereby stability is acquired.

The same principle has been applied to make a watch show time by rolling slowly down an inclined plane. Fig. 9, is the section of a cylinder, which

Fig. 9.



would roll down the inclined plane quickly but for a heavy body P, which is so adjusted, that the cylinder turns round once in twelve hours, while the weight P maintains a constant direction with respect to the axis of the cylinder; so that the wheel to whose axis it is attached does not move round, but allows the cylinder to move round it. The other wheels are under the control of the central wheel, and act the usual parts of clock-work. On one end of the cylinder is a clock-face, the hands to which are attached to the axis of the central wheel.

He submits to be seen through a microscope, who suffers himself to be caught in a fit of passion.—Lavater.

He that does not know those things which are of use and necessity for him to know, is but an ignorant man, whatever he may know besides.—Tillotson.

A man can always conquer his passions if he *pleases*; but he cannot always *please* to conquer his passions.—D. B.

A SCENE IN RUSSIA.

GREAT FETE AT PETERHOFF.

THE whole population of Petersburgh was in motion on the day appointed for the great fête at Peterhoff. It was expected that the entertainment would be more than usually splendid, on account of the presence of the Queen of Holland, then on a visit to her sister the empress; and at an early hour the splendid equipages of the nobility, carriages, droskeys, telegas, and carts, were hurrying along the banks of the Neva, while steam-boats, sail-boats, row-boats, and craft of every description, were gliding on the bosom of the river.

Peterhoff is about twenty-five versts from St. Petersburgh, and the whole bank of the Neva on that side is adorned with palaces and beautiful summer residences of the Russian seigneurs. It stands at the mouth of the Neva, on the borders of the Gulf of Finland. Opposite is the city of Cronstadt, the seaport of St. Petersburgh, and the anchorage of the Russian fleet. It was then crowded with merchant-ships of every nation, with flags of every colour streaming from their spars, in honour of the day.

From the time when we entered the grounds, until we left, at one o'clock the next morning, the whole was a fairy scene. The grounds extended some distance along the shore, and the palace stands on an embankment, perhaps a hundred and fifty feet high, commanding a full view of the Neva, Cronstadt, with its shipping, and the Gulf of Finland. We followed along the banks of a canal, five hundred yards long, bordered by noble trees. On each side of the canal were large wooden frames, about sixty feet high, filled with glass lamps for the illumination; and at the foot of each, was another high frame-work, with lamps, forming, among other things, the arms of Russia, the double-headed eagle, and under it a gigantic star, thirty or forty feet in diameter. At the head of the canal was a large basin of water, and in the centre of the basin stood a colossal group in brass, of a man tearing open the jaws of a rampant lion; and out of the mouth of the lion rushed a jet d'eau, perhaps one hundred and fifty-feet high. On each side of this basin, at a distance of about three hundred feet, was a smaller basin, with a jet d'eau in each, about half its height, and all around were jets d'eaux, of various kinds, throwing water vertically and horizontally; among them I remember a figure larger than life, leaning forward in the attitude of a man throwing the discus, with a powerful stream of water rushing from his clenched fist. These basins were at the foot of the embankment on which stands the palace. In the centre was a broad flight of steps, leading to the palace, and on each side was a continuous range of marble slabs, to the top of the hill, over which poured down a sheet of water, the slabs being placed so high and far apart as to allow lamps to be arranged behind the water. All over, along the public walks, and in retired alcoves, were frames hung with lamps, and everywhere, under the trees, and on the open lawn, were tents of every size and fashion, beautifully decorated; many of them, oriental in style and elegance, were fitted up as places of refreshment.

Thousands of people, dressed in their best attire, were promenading the grounds, but there were no vehicles, until, in turning a point, we espied, at some distance up an avenue, and coming quietly towards us, a plain open carriage, with two horses, and two English jockey outriders, in which were a gentlemen and lady, whom, without the universal taking off of hats around us, I recognised at once as the emperor and empress. He looked every inch a king, and she was my beau ideal of a queen, in appearance and manners. They bowed as they passed, and, as I thought, being outside of the line of Russians, and easily recognised as a stranger, their courtesy was directed particularly to me; but I found that my companion took it very much to himself, and no doubt every long-bearded Russian near us did the same. In justice to myself, however, I may almost say that I had a conversation with the emperor; for although his imperial highness did not speak to me, he spoke in a language which none but I (and the queen and his jockey outriders) understood; for, waving his hand to them, I heard him say in English, 'To the right.'

After this *interview* with his majesty, we walked up to the palace. The splendid regiments of guards were drawn up around it, every private carrying himself like a prince; and I did not admire all his palaces, nor hardly his queen, so much as this splendid body of armed followers. Behind the palace is a large plain, cut up into gravel-walks, having, in one place, a basin of water, with water-works of various kinds, among which were some of peculiar beauty, falling in the form of a semi-globe.

A little before dark, we retired to a refectory under a tent, until the garden was completely lighted up, that we might have the full effect of the illumination at one view; and when we went out, the dazzling brilliancy of the scene within the semicircular illumination around the water-works, was beyond description. This semicircular frame-work enclosed, in a large sweep, the three basins, and terminated at the embankment in which the palace stands, presenting all around an immense fiery scroll in the air, sixty or eighty feet high, and filled with all manner of devices; and for its background a broad sheet of water, falling over a range of steps, with lighted lamps behind it, forming an illuminated cascade, while the basins were blazing with the light thrown upon them from myriads of lamps, and the colossal figures, of a reddened and unearthly hue, were spouting columns of water into the air. More than two hundred thousand people were supposed to be assembled in the garden, in every variety of gay, brilliant, and extraordinary costume. St. Petersburgh was half depopulated, and thousands of peasants were assembled from the neighbouring provinces. I was accidentally separated from all my companions; and, alone among thousands, sat down on the grass, and for an hour watched the throng passing through the illuminated circle, and ascending the broad steps leading toward the palace.

Among all this immense crowd there was no rabble; not a dress that could offend the eye; but intermingled with the ordinary costumes of Europeans were the Russian shopkeeper, with his long surtout, his bell-crowned hat, and solemn beard; Cossacks and Circassian soldiers, and Calmuc Tartars, and cavalier guards; hussars, with the sleeves of their rich jackets dangling loose over their shoulders, tossing plumes, and helmets glittering with steel, intermingled throughout with the gay dresses of ladies, while near me, and, like me, carelessly stretched on the grass, under the light of thousands of lamps, was a group of peasants from Finland, fiddling and dancing; the women, with light hair, bands around their heads, and long jackets enwrapping their square forms, and the men with long great-coats, broad-brimmed hats, and a bunch of shells in front.

Leaving this brilliant scene, I joined the throng on the steps, and by the side of a splendid hussar, stooping his manly figure to whisper in the ears of a lovely girl, I ascended to the palace, and presented

my ticket of admission to the masked ball. I had not been presented at court, and consequently, had only admission to the outer apartments with the people. I had, however, the range of a succession of splendid rooms, richly decorated with vases and tazzas of precious stones, candelabras, couches, ottomans, superb mirrors, and inlaid floors; and the centre room, extending several hundred feet in length, had its lofty walls covered to the very ceilings with portraits of all the female beauties in Russia, about eighty years ago.

I was about being tired of gazing at these pictures of long-sleeping beauties, when the great doors at one end were thrown open, and the emperor and empress, attended by the whole court, passed through, on their way to the banqueting-hall. Although I had been in company with the emperor before, in the garden, and though I had taken off my hat to the empress, both passed without recognising me.

The court at St. Petersburgh is admitted to be the most brilliant in Europe; the dresses of the members of the diplomatic corps, and the uniforms of the general and staff officers, being really magnificent, while those of the ladies sparkled with jewels. I saw them enter the banqueting-hall, painted in oriental style to represent a tent, and might have had the pleasure of seeing the emperor and empress and all that brilliant collection eat; but turned away from a noise that destroyed much of the illusion, namely, the clatter of knives and forks.

I turned to the illuminated scene and the thronging thousands below, descended once more to the garden, passed down the steps, worked my way through the crowd, and fell into a long avenue, like all the rest of the garden, brilliantly lighted, but entirely deserted. At the end of the avenue, I came to an artificial lake, opposite which was a small square two-story cottage, being the old residence of Peter the Great, the founder of all the magnificence of Peterhoff. It was exactly in the style of our ordinary country houses, and the furniture was of a simplicity that contrasted strangely with the surrounding splendour.

The door opened into a little hall, in which were two old-fashioned Dutch mahogany tables, with oval leaves, legs tapering and enlarging at the feet into something like a horse-shoe. In a room on one side was the old Czar's bed, a low, broad wooden bedstead, with a sort of canopy over it, the covering of the canopy and the coverlet being of striped calico; the whole house, inside and out, was hung with lamps, illumining it with a glare that was almost distressing, contrasted with the simplicity of Peter's residence; and, as if to give greater contrast to this simplicity, while I was standing in the door of the hall, I saw roll by me, in splendid equipages, the emperor and empress, with the whole of the brilliant court which I had left in the banqueting-hall, now making a tour of the gardens. The carriages were all of one pattern, long, hung low, without any tops, and somewhat like omnibuses, except that, instead of seats being on each side, there was a partition in the middle, not higher than the back of a sofa, with large seats like sofas on each side, on which the company sat in a row, with their backs to each other; in front was a high and large box for the coachman, and a footman behind. It was so light that I could distinguish the faces of every gentleman and lady as they passed; and there was something so unique in the exhibition, that, with the splendour of the court dresses, it seemed the climax of the brilliant scenes at Peterhoff. I followed them with my eyes till they were out of sight, gave one more look to the modest pillow on which old Peter reposed his careworn head, and at about one o'clock in the morning left the garden. A frigate brilliantly illuminated was firing a salute, the flash of her guns lighting up the dark surface of the water, as I embarked on board the steam-boat. At two o'clock, the morning twilight was like that of day; at three o'clock, I was at my hotel, and probably at ten minutes past, asleep.——?

SUMMER MORNING.

Go forth, thou care-worn man,
And roam the woods once more,
The forest pathway tread,
And by the lake's calm shore;
Forget thy hoarded gold,
Thou reckless man of sin,
And let this Summer morning
A short-lived homage win.

Go forth, thou sinless child,
With that archly-beaming eye,
Shout forth thy buoyant gladness,
And nature will reply;
Thy favourite brook is trilling
A mirthful glee to-day,
And countless voices calling,
"Forth to the woods, away!"

Go forth, thou maiden fair,
Where glides the peaceful stream,
Where woodland flowers are springing,
A waking vision dream;
O joy that never wearies!
On thy lover thou art dwelling;
Thy deeply-shrouded secret
That blush is boldly telling.

Go forth, aspiring youth,
To ponder daring schemes;
Thou wilt come yet once again,
To mourn those fatal dreams;
And marvel thou couldst leave
Yon sweet secluded glen,
To win the phantom glory,
Among thy fellow men.

Go forth, thou languid form,
Thou who art doomed to die,
Whose fate is written on that flush,
And in that glassy eye;
Go forth, and once again
Revel in this pure air;
Unconscious of the future,
Pour forth a hopeful prayer.

And thou, whose poet's soul
Worships each dale and wood,
Thy airy visions weave
In yon sweet solitude;
Though counselled by the wise
And cold to shun such lure,
O, keep that inner fount
Of thought and feeling pure!——A. E.

All deception in the course of life, is indeed nothing else but a *lie* reduced to *practice*, and *falsehood* passing from *words* into *things*.——South's *Sermons*.

It is with our judgments as our watches: none go just alike, yet each believes his own.——Pope.

Truth will be uppermost, some time or other, like cork, though kept down in water.——Sir William Temple.

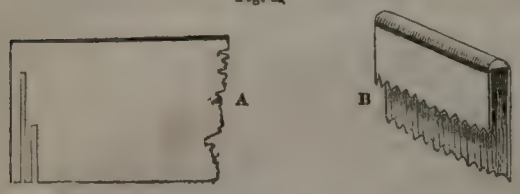
Reason requires culture to expand it. It resembles the fire concealed in the flint, which only shows itself when struck with the steel.——Gerdil.

Without recurring to any effects produced upon the general system, every individual in every stage, and under every circumstance of existence, has a post to maintain, in which he is placed by the Sovereign Disposer of the universe: on a diligent attention to the duties arising from that situation, whatever it be, and not from a desertion of it, must all our happiness depend.——Mrs. Carter.

THE COMB-CUTTING ENGINE.

THE teeth of combs were originally cut by means of a double saw, one blade of which was twice the length of the other; the teeth were cut as follows:—let A, fig. 1, represent the piece of horn or wood, out of which the comb is to be cut; it is of the exact size of the comb. B is the saw with its two unequal blades; the first cut of this saw has already made

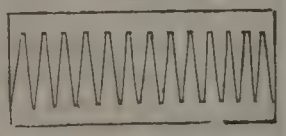
Fig. 1.



two nicks in the material, that by the longer blade to the full depth of the tooth, and that by the shorter to half the depth; the longer blade is now placed in the shallow nick, which it deepens to its full extent, while a third nick is made by the shorter blade: in this manner the whole of the teeth were gradually marked out, and were afterwards finished by means of files. The next improvement was the employment of circular saws of different diameters, instead of the two-bladed straight saw.

The manner in which combs are cut at present is an apt illustration of the advantage derived to manufactures and the arts by the inventions of ingenious men, directed frequently by accident. About twenty years ago, the principal house in London for the sale of combs had received from abroad some patterns of ornaments, like the spikes and balls of coronets, to be attached to tortoise-shell combs. They gave the order to execute these to an ingenious artist of the name of Ricketts, who contrived a punch, by the successive pressure of which, on a thin piece of warm tortoise-shell, he cut out the pattern piece by piece; on disengaging the pattern from the other part, he observed to himself, "Here are two combs cut out of the material for only one." He improved on this hint, and constructed a machine in which he employed a cutter like a chisel, which, descending upon the shell, cut one side of a tooth at a time, and then, by shifting the bed on which the shell was laid, and moving it forward a short distance, the other of the tooth was cut: the result of this operation may be seen in fig. 2, which represents a piece of shell very little larger than necessary for one comb, but which, by this means, is made to produce two.

Fig. 2.



When the knowledge of this engine began to spread abroad, various contrivances were resorted to to guide the direction of the cutter, so as to cause it to descend obliquely and at regular intervals; but this oblique action was next avoided by the employment of two cutters, or chisels, placed at an angle with each other, by means of which a perfect tooth is cut at one blow. The scales of tortoise-shell being much thinner on one edge than the other, were not so well adapted for this invention as horn, the thin edge not being thick enough for the back of the comb: but this can be remedied by soldering another piece of shell upon the thin edge; it is effected in this manner. The two surfaces to be united are nicely rasped and smoothed, placed between two thin boards, and submitted to the action of a screw-press. The press is put for some hours in boiling water and tightened from time to time, until at length a complete junction takes place.

The engine represented in the engraving is copied from the *Transactions of the Society of Arts*, vol. 47. The cutters are seen at A A, fig. 3; they are arranged in this manner:—*a a* are the edges of the chisels set at an angle by *c*, which is called the *filling-up piece*: *b* is a smaller chisel which cuts away the point of the tooth from the shell, to which it would otherwise be attached; but this small chisel only effects this operation on one of the combs: the opposite teeth are cut away by the bent ends *d d* of the longer chisels, which at each blow half separate two teeth.

Fig. 3.

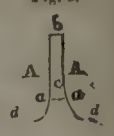
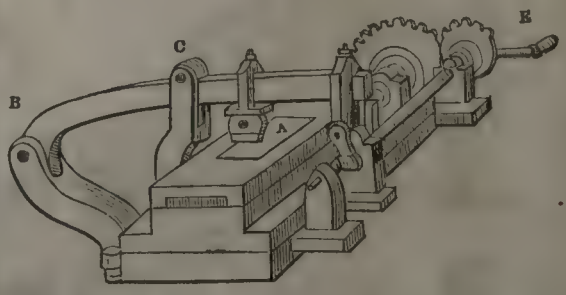


Fig. 4.



The shell is firmly fixed beneath the cutter A, and the engine acts in the following manner:—B is a strong bar firmly jointed behind to the framework; it is kept steady by the loop C, and is moved downwards by means of the crank in front, carrying along with it its cutters upon the shell. This crank is moved by the handle and winch E; and is so fixed that it brings down the cutter upon the shell at that part of the revolution of the winch, when the wheel with a few teeth which is fitted to its axis, is clear of the teeth of the larger wheel. As soon as the tooth is cut, the crank in its revolution raises the lever and cutter, and the teeth on the small wheel entering those of the larger, move the large wheel a part of a revolution. This large wheel is fixed to a screw which is attached to a sliding table, on which the tortoise-shell is placed; the screw is consequently turned a part of a revolution, and the shell and table thrust forward proportionately. The smaller wheel becomes again disengaged from the larger, the crank again brings down the cutter on the shell, and another tooth is cut, and this alternate action takes place until the two combs are cut out. Another piece of shell is supplied, and the movement of the handle of the winch being reversed, the shell and the table move back to their former position, and two more combs are separated. If combs with finer teeth are required, the large wheel is changed for another with more teeth on its circumference, and the cutters are also set at an acuter angle.

LIBERTY is to the collective body, what health is to every individual body. Without health, no pleasure can be tasted by man; without liberty, no happiness can be enjoyed by society.—BOLINGBROKE.

IT is impossible to make people understand their ignorance; for it requires knowledge to perceive it; and therefore he that can perceive it hath it not.—BISHOP TAYLOR.

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GREY-STREET, NEWCASTLE.

GREY-STREET—STATUE OF EARL GREY—THE CENTRAL EXCHANGE—MEAT, POULTRY, AND VEGETABLE MARKETS—ROYAL ARCADE—TYNE BRIDGE.

We come now to the examination of the new buildings erected by Mr. Grainger, a gentleman of whom Newcastle is justly proud. Emerging from a comparatively humble station, he displayed at an early age such extraordinary talent as an architect, that he was at once employed to erect every public building required in the town; and the singular beauty of his structures created a desire for fresh buildings, while his integrity won him the confidence of capitalists able to bear the expense of extensive speculations.

Grey-street is without a rival in the world as a street built merely for business, and resembles rather a street of palaces than houses. It surpasses Regent-street, London, in the richness and variety of its architecture, and in the harmonious arrangement of its parts, and it has the decided advantage of being all built of solid stone, instead of brick faced with stucco. It was erected in the short space of three years, though its elaborate workmanship would seem to have required the labour of a century. The buildings form groups, each of which seems to be one great public edifice, worthy to have been raised by some powerful monarch. The central group on the west side, occupied by the Northumberland District-Bank, and the Branch-Bank of England, has all the splendour of a palace. Although they are elaborately finished, there is nothing tawdry or meretricious in these edifices, for the parts harmonize with each other, and all the parts are so exquisitely proportioned, that we feel while looking at each building, "here is nothing to be added and nothing to be taken away, without injury to the striking effect of the whole." At the point of entrance from the north to Grey-street and Grainger-street, a column is erected surmounted by a colossal statue of Earl Grey in his parliamentary robes. The statue is fourteen feet high, and is an excellent likeness. The total height of the column is 135 feet; a circular staircase within leads to a balcony at the base of the statue, from whence a fine panoramic view of the surrounding country may be obtained. This column is so placed as to form the termination of Grey-street, called after the noble earl; and of Grainger-street, which derives its name from the public-spirited architect. The best view of it, however, is from Eldon-square, so called in honour of Lord Eldon, late Lord Chancellor of England, who was a native of Newcastle.

The most striking view of Grey-street is from the top of Dean-street; for though the Grey-column is hid by the windings of the street, the cupolas of the Central Exchange are seen at the termination of the vista, and produce a very striking effect by the gorgeous bronze plumes sculptured on their summits. The Central Exchange was erected by Mr. Grainger for a Corn-market, and offered to the corporation as a free gift. Externally this splendid building displays a rich Corinthian front, slightly varied by the introduction of the other orders, without, however, weakening the unity of the design. But it is scarcely possible to describe the sensations produced by the interior; it presents a semicircle of 150 feet in diameter, with an additional oblong area of twenty feet wide adjoining the diameter. The principal entrance opens into the semicircle, and is surrounded by twelve massive and lofty pillars of the Ionic order, with fancy embellishments. The light of this gigantic edifice is obtained through rather more than ten thousand square feet of glass in the sides of the roof and the crown of the dome. The roof is constructed on a novel principle, somewhat similar to that used in the finest specimens of ecclesiastical architecture,

and has a very striking effect when viewed from below. During the recent meeting of the British Association in Newcastle, the Central Exchange was used for the general meetings of the Association, and furnished accommodation for nearly six thousand persons. On this occasion its acoustic powers were severely tested, and it was found to be one of the best rooms for hearing in, notwithstanding its vast size, which the Association has found in any place it has yet visited. Under a colonnade of four Ionic columns inside of the Exchange, and by a double flight of stone steps from Market-street, are entrances to the exhibition-room and other chambers of the North of England Society for the Promotion of the Fine Arts. The exhibition of sculptures and paintings this year, though inferior in quantity to that of the National Gallery, was fully equal to it in quality, and it deserves to be remarked that most of the best specimens were the work of native artists. In one of these apartments a room was opened for the exhibition of specimens of British art and manufactures during the recent meeting of the British Association, and here also the talents of the Newcastle people were conspicuous, especially in the models for steam-machinery, and for the construction of bridges on railways.

The meat, poultry, vegetable, and butter markets, are all under one roof, occupying a space of about two acres, having Grainger-street to the east, Clayton-street to the west, Nelson-street to the north, and Nun-street to the south. These markets occupy the site of a spot called the Nuns'-field, which once belonged to the nunnery of St. Bartholomew, and joined the grounds of the Franciscans, or Grey-friars. This circumstance did not escape the notice of the local poets who abound in Newcastle, and it was commemorated in a song. We may add that there has been scarcely any change made in Newcastle within the last century, which has not been commemorated in a local ballad.

The butcher market consists of four spacious avenues, each 338 feet in length, 20 feet in breadth, and 27 feet in height. The light descends in the eastern avenue from fifty sky-lights, through apertures in the coffer ceiling, with a most pleasing effect; there are also the extraordinary number of 360 glazed sashes to open and shut as the weather may require. These four principal avenues are crossed by four lofty arcades, each twelve feet wide. In the evening the whole is lighted with gas, and has a most brilliant effect.

The vegetable market consists of one spacious and splendid hall, 318 feet in length, and 57 in width, within the fronts of the fruit and vegetable shops, being of greater dimensions than the venerable hall of Westminster. The roof, upwards of forty feet in height, is framed of timber-work in the cathedral style; it is supported by thirty cast-iron pillars, from each of which, at the height of twenty-six feet, is suspended a large gas-lamp. The roof over the central space is enclosed by a glazed lantern, extending the whole length of the hall, while the sides are lighted by 104 windows. In the centre of the market are two magnificent fountains, similar to the celebrated fountain in the Borghese Palace at Rome; the basins are each capable of containing three thousand gallons of water, and they throw up a jet of twelve feet in height; the water falls into splendid vases of six feet in diameter, beautifully sculptured with foliage and tracery, over whose circumference the water falls in a graceful shower into the large basins below. This market, which is without a parallel in the world, was fitted up as a promenade for one evening during the recent visit of the British Association to Newcastle, and the scene which it displayed resembled enchantment rather than the work of human hands.

The Royal Arcade ranks next to the markets in beauty and convenience. Its front is 94 feet in length and 75 feet in height; the entrance is adorned with two massive pillars of Doric architecture, and the entablature is surmounted by six Corinthian fluted columns, over which is a richly carved frieze. From the front the arcade extends eastwards, and consists of three stories, the basement Doric, and the upper Corinthian, forming an extensive range of sixteen shops and offices, with cellars and shops below, occupying one entire side of Manor-street. The length of the building is 250 feet, the breadth is 20 feet, and the roof, which is 35 feet in height, contains eight conical lanterns, which amply illuminate the building. In this edifice are the Post Office, the Excise Office, and several other public offices, all of which are very spacious and convenient.

Tyne Bridge is an edifice of great strength and some beauty; near it is the Close, where anciently the principal inhabitants were accustomed to reside, before Mr. Grainger erected his "city of palaces" in the Upper Town. Most of these houses are now occupied as stores or manufactories

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ON THE STETHOSCOPE, OR CHEST-EXPLORER.

ONE of the most remarkable instances of the application of physical science to the alleviation of human suffering, is presented by the little instrument known under the name of the *Stethoscope*. The principle on which this instrument acts, and the service which it is calculated to render to the medical practitioner, admit of being popularly explained, without entering upon the refined difficulties of the medical treatment of diseases: we propose, therefore, to give this explanation.

Almost every kind of motion, whether of a solid, a liquid, or an aëriform body, is calculated to produce a sound, more or less audible to the ear: the blast of air which we blow into a flute, and the rush of wind through the key-hole of a door, are, alike, instances of the production of sound by the motion of air: the mighty crash produced by a cataract, or the rippling noise of a flowing brook, show us that the motion of a liquid is a source of sound: while the great majority of our musical instruments, and of the sounds which meet the ear in every-day life, afford us proof of the effect produced by the vibration, the friction, or the progressive movement, of solid bodies.

Now, if we consider the structure of the human frame, we become conscious that there are incessant movements going on in the interior of the body, the cessation of which can only occur when death stops the living machine. The flow of blood to and from the heart, the entrance and exit of air in the process of respiration, the forcible passage of air in the process of speaking or singing, all produce sounds differing in intensity and character according to circumstances. Again; if the bony or fleshy parts of the body be struck, the parts are set into a vibratory state, from which results a dull imperfect sound; and this sound is more or less modified by the nature and contents of the cavities which are encompassed by the bony or fleshy portions.

A consideration of these circumstances gradually led medical men to the inquiry how far the sounds

emitted by the human body would afford indication of the existence of disease within the system. The lungs, for instance, are suspended in the cavity of the chest, and both within and without the lungs air exists, which air modifies the sounds produced by the natural or the artificial action of the lungs. Now, if through the influence of disease, the solid substance of the lungs become either smaller or larger in bulk than the natural size, the quantity of air to fill the vacant spaces must be changed, and the resonant or echoing effect of sound against the sides of the cavity of the chest, more or less interfered with. If, therefore, in a state of health, a particular sound be emitted from the chest, and if, during the existence of asthma, a different sound be heard, the physician would take that difference of sound as a symbol of the existence of asthma: and so with any other disease.

Acting on these principles, Auenbrugger, a physician of Vienna, suggested, in 1761, the mode of *percussion*, as a means of determining the healthy or unhealthy state of the system. The chest, and other hollow parts of the body, were struck briskly, but not forcibly, with the ends of the fingers, and the ear was applied so as to listen to the sounds resulting from the blows; and an earnest and unremitting attention to the sounds thus elicited, enabled physicians to discriminate between that character of sounds which indicated a sound state of health, and those which appertained to disease; and still further, between those belonging to one disease, and to a different disease. Before we doubt the probability of detecting difference of sound in this way, we must remember how very similar are the means by which artisans frequently *hear* the state of their work: a bricklayer, by striking a few smart blows on a wall, can frequently determine the thickness and nature of it, by the sound which results from the blow. A carpenter can, by similar means, determine the position of joists, &c., under a boarded floor. These facts prepare us to admit another, that percussion on the chest has been, and still is, resorted to as a means of detecting the existence of disease in the lungs, heart, and adjacent parts.

In some cases the chest itself was struck; in others, a layer of cloth was placed between the fingers and the chest; and M. Piorry, a French physician, suggested the application of a thin solid plate between the fingers and the chest, as being advantageous under some circumstances. But it will be observed, that in all these cases, the sound elicited is an artificial and unnatural one, not resulting from the regular movements in the system, but from a disturbance caused from without. It therefore occurred to physicians, that by placing the ear close to the chest, the natural actions of the system might be heard going forward, and that in a state of disease these sounds might be different from those heard in a state of health. This plan has been pursued with considerable success, as a means of obtaining symptoms which may guide the physician in his mode of treatment.

But an improvement of an important kind was made in this mode of operation by M. Laennec, a French physician of great eminence. This gentleman was born in Bretagne, in 1781, and while yet a young man, greatly distinguished himself by his skill in *auscultation*, that is, *hearing* the sounds emitted by the chest, &c., during the natural actions. In 1816, he was called to attend a patient who had an affection of the heart, and being unable to obtain the requisite symptoms by the application of his ear, he devised a new mode of proceeding.

I happened, (says he,) to recollect a simple and well-known fact in acoustics, and fancied that it might be turned to some use on the present occasion. The fact I allude to is, the great distinctness with which we hear the scratch of a pin at one end of a piece of wood, on applying our ear at the other. Immediately on this suggestion, I rolled a quire of paper into a cylinder, and applied one end of it to my patient's chest, and the other to my ear, and was not a little surprised and pleased, to find that I could thereby perceive the action of the heart, in a manner much more clear and distinct than I had ever been able to do by the immediate application of the ear."

Here at once was opened to M. Laennec a new field of investigation, from which he obtained most fruitful results. From his simple quire of paper he proceeded to other materials which he thought might be better fitted for the object in view. In this inquiry he was led to the adoption of an important principle in the science of acoustics, namely, that sonorous vibrations are communicated from one body to another more perfectly, when the conducting body resembles in density the body which is vibrating; that is, that a column of air is best fitted for conducting vibrations excited in air, but that a solid conductor is more appropriate when the vibratory body is a solid or a liquid. Now, Laennec considered that the sounds emanating from the chest, arise from the motion of air to and from and within the lungs; whereas, the sounds emitted from the heart are caused by the motions of a liquid; that is, the blood. He therefore conceived that a column of air would be the best conductor when the motions of the lungs were to be investigated, but that a solid cylinder of wood would be a better form when the motions of the heart were to be observed. He procured cylinders and tubes of various kinds, and found that a convenient length for this instrument was about ten or twelve inches, and about an inch and a half in diameter. This he formed of walnut, cedar, and other kinds of wood, in order to determine which is best fitted for the purpose.

The movement of the air in and round the lungs during respiration, differs from that occasioned by the voice, inasmuch as the latter is confined principally to two tubes or canals proceeding from the lungs to the throat; whereas, during respiration, the whole cellular substance of the lungs furnishes a series of little canals for the passage of air. Laennec conceived, therefore, that to obtain indications of the existence of disease in the lungs, it would be desirable to use a tube, one end of which was spread out like the mouth of a trumpet, by which the action of a larger space might be tested; but for those parts of the contents of the chest connected with the direct production of voice, he found a hollow cylinder, equal in diameter through its whole length, to be the most favourable form.

The instrument thus formed he termed the *Stethoscope*, from two Greek words signifying a *chest-explorer*,—a name significant of its employment. The three forms of the instrument are conveniently combined in one, by a little judicious arrangement. A cylinder nearly a foot long, and an inch and a half in diameter, is employed as a Stethoscope for the heart: a small tube bored through the middle of this cylinder, serves as the Stethoscope for the organs of voice; and by unscrewing part of the length of the cylinder, and fixing on a trumpet-shaped piece, the instrument assumes that form most advantageous for the exploration of the respiratory organs.

One of the most difficult parts of Laennec's inquiry, was, to find proper language in which to describe the various sounds which the actions of the body emitted. He published a work expressly

relating to auscultation by means of the Stethoscope; and when detailing the symptoms which indicated disease, he had to convey a correct idea of the sort of sound belonging to each disease. Some of his comparisons are remarkable: one sound is compared to the rush of wind through a small orifice: another to the flapping of a valve: another to the creaking of the leather of a new saddle: a fourth, to the sound produced by stroking the head of a cat while the animal is purring. There is nothing absurd or trifling in such comparisons, since it is as impossibe to find appropriate and expressive names for all the varieties of sound, as for all the tints of colour: in order, therefore, to convey to others a precise idea of the nature of a sound, it is necessary to adopt such a standard of comparison as is familiar to most persons.

In the application of the Stethoscope, the ear is applied closely to one end, whilst the other end is placed against various parts of the chest, according to the spot which it is wished to explore. In some cases a tube of caoutchouc, or Indian rubber, has been employed instead of wood; but the impossibility of rendering the internal surface of such a tube perfectly smooth and cylindrical, detracts from its usefulness; for whenever sounds have to be conveyed through a tube, it is of much importance that the sides of the tube should be free from any protuberances or roughness of surface.

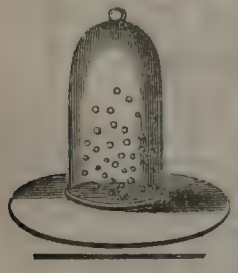
ELECTRICITY.

No. V.

ELECTRICAL EXPERIMENTS.

THE following, notwithstanding its apparent simplicity, is as good an experiment as we can select for illustrating electrical attraction and repulsion.

Having provided a glass vessel of the form represented in the annexed figure, or a large tumbler will do equally well, let it be wiped clean and perfectly dry, and by means of a pointed wire attached to the positive conductor of the electrical machine, the inside of the glass must be charged with electricity. If it then be placed on a table, and made to cover a dozen or two of pith-balls, the latter will immediately begin to leap from the table to the top and sides of the glass, and back again, and this they will continue to do for several minutes. When the motions of the balls have ceased, they will almost always be renewed on passing the hand gently over the outside of the glass.



With so great a number of balls as we have mentioned, this experiment is, perhaps, more amusing than instructive; but when only about half a dozen are used, and those of different colours or sizes, if we watch attentively their movements, we shall have no difficulty in understanding the cause.

On presenting the inside of the glass vessel to the pointed wire, as just described, its surface becomes coated with positive electricity, and at the same time, and exactly to the same degree of intensity, the outside of the glass will be negatively electrified. The instant the glass is placed on the table, the pith-balls and that part of the surface of the table directly underneath it, are similarly affected. We have before stated as a first principle in this branch of science, that bodies similarly electrified repel, those dissimilarly electrified attract each other. Here, then, we find an explanation of the movements of the pith-balls. The redundant electricity accumulated on the inside of the glass, has a tendency to escape to the outside; but glass being a non-conductor, a communication is more readily effected by the pith-balls than it would be if the glass were left to itself. The balls, therefore, attracted by the electricity on the inside of the glass, leap from the table towards it, and having received a charge of positive electricity, are instantly repelled by the glass and attracted by the table, to which they return, and after delivering what they have received, leap again to the glass for a further supply. These alternate movements continue until the force of gravity acting on the balls, and the attractive influence of the glass, are exactly balanced.

Whilst the pith-balls are engaged in carrying positive electricity from the inside of the glass, it is necessary that negative electricity should in the same proportion make its escape from the outside; a process which is greatly accelerated by passing the hand over it. Hence it happens that the balls, after having been some time at rest, may in this way be made to resume their movements.

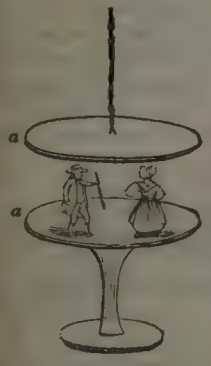
Another experiment, furnishing an example of electrical repulsion, is effected by means of what is called an electrical head of hair; consisting of a block of hard wood, carved and painted to represent a human head, and covered with long hair, the finer the better. A piece of wood, or stout brass wire, projects from the lower part of the head, by which it is fixed to the conductor. On putting the machine in motion, the electricity excited by it escapes at the points of the hair, which separate and stand erect, presenting a most grotesque appearance, and which is occasioned by each hair being similarly electrified.

These examples, all tending to illustrate the same principle, may be greatly multiplied; and although the apparatus partakes in some respects of the character of philosophical toys, yet it is not on that account to be despised. Of this class is the electrical bells, which are so arranged that, by the alternate attractions and repulsions of small brass clappers placed outside them, a constant peal is kept up. The arrangement is as follows; (see fig.) *a* is a brass hook fixed to a piece of wire, the length of which must be determined by the size of the bells, and it may either be straight or curved, but the latter form is the best. *b b b* are three bells, the outside ones suspended by brass chains, but that in the centre by silk cord, as are also the clappers *c c*. The centre bell is made to communicate with the table or floor by a piece of chain *c*.

The bells being attached to the positive conductor by the hook *a*, on turning the machine the electricity endeavours to make its escape down the chains by which the two outside bells are suspended, and which are, of course, positively electrified; that in the centre, by its communication with the earth, being in

the opposite state. Before the electricity proceeding from the machine can reach the ground, it must pass from one or both of the outside bells to that in the middle, which is accomplished by the brass clappers suspended between them, being alternately attracted and repelled in the same manner as the pith-balls already described; and thus, in conveying away the electricity, the clappers strike the bells and set them ringing.

Another experiment equally amusing as any of the preceding, and affording one of the finest illustrations that can well be imagined of the phenomena under consideration, is that of the dancing figures. It is performed in the following manner:—(see fig.) *a a* are two circular plates of brass about nine inches in diameter, or if these cannot conveniently be obtained, discs of wood the same size, and covered on both sides with tin-foil, will answer the purpose. One of these plates, or discs, must be suspended by a chain from the prime conductor, and the other at about four inches below it, supported by a suitable, but not an insulated, stand. Place on the lowermost plate, two or three pith figures of men or women, (which can be obtained at the philosophical instrument makers' very beautifully formed,) and on turning the machine the figures will start up and execute evolutions so rapid and fantastic, that they would be deemed hardly possible by persons who had not before witnessed them. In this case we see the force of gravity in the figures overcome by the attractive and repulsive influence of the electricity they are the means of conveying from the upper to the lower plate; a very feeble current of which is sufficient to preserve at least two of the figures in an erect posture, for any length of time that may be desired. To understand this experiment properly, the room in which it is performed should be partially darkened, when each extremity of the figures will be seen to be illuminated by the current of electricity which is passing through it. If the machine be turned quickly, more electricity will be excited than the figures can carry off; and then a portion will be observed making its escape from the edges of the uppermost plate into the atmosphere. Where pith figures, such as we refer to, cannot be had, their places may be supplied by paper ones; but the paper of which they are made must not be very thick.



It is impossible, within anything like reasonable limits, to give a full description of all the methods by which examples are furnished of electrical attraction, and repulsion, as accompanying every case in which the electrical relations of bodies are disturbed. But we shall mention a few more, and we hope to make them intelligible without the aid of figures.

Fix a short blunt wire into the prime conductor, and to the end of it attach a piece of sealing-wax. If the wax be for a moment inflamed, and just when it is blown out, the machine set in motion, a great number of long and very slender filaments will be separated from the mass; and if a sheet of writing-paper be held about a foot from the wax, the filaments will adhere to the paper in the form of very beautiful net work.

Hold in the hand, about six inches distant from the conductor, a piece of cotton wool or a very light downy feather. On exciting the machine, the cotton or feather will fly towards the conductor, adhere to it for a moment, then return to the hand, and back again to the conductor; and by a little management on the part of the operator, it may be made to do so at a distance much greater than that we have mentioned, and during many minutes in succession.

Suspend by a chain from the conductor a small metallic bucket containing water, a tube being inserted in the bottom of the bucket, the bore of which is so small that water will pass through it only drop by drop. On setting the machine in motion the water will flow rapidly through the tube, separating into innumerable drops. If the charge of electricity communicated to the water be tolerably powerful, in a darkened room, it will have the appearance of a luminous shower

A pretty piece of apparatus we often use is made as follows:—Procure some fine spun glass, either white or a mixture of different colours. Cut the glass into lengths of about nine inches, and then place them together, fastening them at one end to a piece of wood or stout wire. If we attach this bundle of spun glass by its stem to the conductor, and slowly turn the machine, the fibres gradually separate until the whole bundle has expanded, resembling a full-blown flower.

To these, if we deemed it necessary, we could add many more illustrations of electrical attraction and repulsion. We must not, however, omit the following extremely simple, yet useful, piece of apparatus, which is called Henley's Quadrant Electrometer. It consists of a stem of wood or metal, about eight inches long, terminating at one end in a ball, and the other tapered so that it may fit tightly into the conductor. To the upper part of this stem is attached a semicircular piece of some hard wood, or, what is much better, of ivory, on which is a scale of 180 equal parts, reckoning ninety from the upper and lower parts of the scale to the point most distant from the stem. In the centre of the semicircle is a pin, to which is suspended, so that it may move freely, a very slender rod of box-wood, or cane, say, five inches long, a pith-ball being attached to its lower extremity. The use of this instrument will be hereafter explained; but its action depends on the repulsion existing between the stem, when electrified by contact with the machine, and the moveable rod; and in proportion as the pith-ball recedes from the stem, do we judge relatively of the intensity of the charge of accumulated electricity.

THE character of the true philosopher is to hope all things not impossible, and to believe all things not unreasonable. He who has seen obscurities which appeared impenetrable in physical and mathematical science suddenly dispelled, and the most barren and unpromising fields of inquiry converted, as if by inspiration, into rich and inexhaustible springs of knowledge and power, on a simple change of one point of view, or by merely bringing to bear on them some principle which it never occurred before to try, will surely be the very last to acquiesce in any dispiriting prospects of either the present or future destinies of mankind; while, on the other hand, the boundless views of intellectual and moral, as well as material relations, which open on him on all hands in the course of these pursuits, the knowledge of the trivial place he occupies in the scale of creation, and the sense continually pressed upon him of his own weakness and incapacity to suspend or modify the slightest movement of the vast machinery he sees in action around him, must effectually convince him, that humility of pretension, no less than confidence of hope, is what best becomes his character.—HERSCHEL.

THE VILLAGE OF LEADHILLS, LANARKSHIRE.

THE village of Leadhills is situated in the parish of Crawford, and county of Lanark, Scotland, at the altitude of 1280 feet above the level of the sea. The prevailing rock in the neighbourhood is greywacké; but at no great distance clay-slate and green-stone are found, and coal within ten miles, at Sanquhar and Douglas. The altitude of the Lowthers, the highest hill in the neighbourhood, is about 2400 feet.

According to common report, the lead mines were discovered by a German of the name of Bulmer, when searching for gold in the banks of the adjoining rivulets. This account is extremely probable; for the numerous hillocks on the banks of the streams which discharge themselves into the Clyde and Nith, bear evident indications of having been thoroughly searched for that precious metal: even so much so that those miners who at present amuse themselves during their leisure hours, in searching for gold, cannot find a spot that has not previously been explored.

The method of searching for gold, is, I believe, the same in every country. However, the one adopted at Leadhills is as follows: the surface of the rock is laid bare; the earth, sand, &c., in its crevices, are collected, riddled, and washed. The water carries away the earthy particles, and leaves those materials which are of greater specific gravity than itself, as flint, quartz, and what gold there may be. The proceeds from one puddle, as it is called, are generally, at the most, not more than a few particles, not larger than the point of a pin; but a man in six hours, at an average, may collect about four pennyworth of gold. Some pieces, however, have been found as large as a pea, or small bean.

These gold-mines, however, were once productive; for history informs us that in the reign of James V. of Scotland, three-hundred men were employed in them; and when that monarch, in a hunting excursion in the adjacent moors, dined in Crawford castle, each of his retainers, for dessert after dinner, was presented, on a wooden platter, with a few bonnets crowns, as the produce of the soil. These pieces were coined from gold obtained in the mines of Glengonar, the rivulet upon which Leadhills is now built.

Lead, however, for centuries, has formed the mineral riches of these mines. The vein has more than once expanded to the enormous width of fourteen feet; but I myself never saw it more than four and a half feet, and this was considered by the miners as a *very good* lead. At present the crip, or annual number of bars, (of one hundred and forty-four pounds each,) amounts to 10,000 in Leadhills, and to about 8000 in Wanlockhead; whereas at one period 35,000 were made at the former, and 15,000 at the latter.

It is not, however, to facts such as I have mentioned, that I particularly wish to call attention, but to the mental superiority of these miners over miners in other parts of the world, and to show that even among a class of workmen who might be supposed incapable of profiting by good example, one man of intelligence may produce beneficial effects, that for ages will be felt and duly appreciated. This individual was Mr. James Stirling, who in the middle of the last century, was overseer at Leadhills. Mr. Stirling is known to the mathematical world for two elegant propositions, which he communicated to the Royal Society of London, in 1735, for determining the form of a homogeneous spheroid turning round its axis; and which, when applied to the earth, perfectly coincided with Newton's determination, that the revolving body was not an accurate elliptical spheroid, but approached infinitely near to that figure. When at Leadhills he instituted a library among the miners, and strongly advised them to subscribe; and with such success, that there is not a workman about the village who is not a member of the library. The number of volumes, embracing the standard works on every branch of science, in 1830, amounted to two thousand, whilst the miners at Wanlockhead, another mining village within two miles of Leadhills, but in the county of Dumfries, possess another library, almost equally extensive. The effects of such institutions have been felt, not only in civilizing the inhabitants generally, but the small village of Leadhills, containing twelve hundred inhabitants, has the honour of producing two men, whose names bid fair for immortality—Allan Ramsay, the poet, and William Symington, the engineer.

Whilst in other mining districts, crimes are of frequent occurrence, none, excepting petty offences, were ever committed here; and whilst the children of colliers and miners are generally entirely illiterate, there is neither a boy nor a girl in these villages, who cannot read, and most of them can write. To whatever cause it may be attributed, (and I think it is due to the taste for reading that has been produced amongst them)—the apparent comfort of the people, the neatness of dress of the children, and the intelligence of the men, cannot be denied. For not only to miners in other parts of the world are they superior, but to the working classes even in Scotland, which is admitted to possess the most intelligent peasantry on earth.

Seeing then that such beneficial effects have been produced by such apparently small causes, might not the overseers of other mining districts, instigated by the example of Leadhills, try to institute reading societies among their workmen? for it will always be found that correctness of moral conduct follows the cultivation and enlightenment of the mind. It is true that the Leadhills and Wanlockhead miners possess two special advantages; they only work six hours in the twenty-four, and have the perquisite of obtaining as much land from their landlords, the Earl of Hopetoun at Leadhills, and the Duke of Buccleuch, at Wanlockhead, as they can cultivate with the spade. The last might be considered as of hardly any advantage in a pecuniary point of view, as the uncultivated land in the neighbourhood rents at two shillings per acre; but it is still unknown what spade labour can effect, even in the most unpromising circumstances, as will be proved from an account which I have received of the enormous crops that have been produced at Leadhills, and which I communicate as being important, not only in an economical, but also in a geological point of view

The account to which I refer appeared in the *Scotsman*. It is as follows:—"Mr. John Hunter, Leadhills, planted in 1835 sixteen Scotch falls (being the tenth part of a Scotch acre) with potatoes, which produced the extraordinary quantity of 335 imperial stones, being at the rate of twenty-one tons to the Scotch acre (or seventeen and a half to the English). And from a square mile of surface, around the village, it is calculated that 25,000 stones of hay (twenty-two pounds to the stone), and 12,000 stones of potatoes, are annually produced." The allotment system has been strongly advocated by Mr. Howitt, as being well fitted to a considerable extent, and with great advantage, both economically and morally, as confirming the moral sentiments and social condition of the people, in the neighbourhood of Nottingham; but the

climate of Nottingham is, I believe, as fine as any in England; whereas at Leadhills it is quite the reverse: and still human labour has triumphed over the sterility of the soil and the backwardness of the climate.

"When further attention," remarks the editor of the *Scotsman*, "is now so generally called to the practicability of improving our waste lands, this instance of productiveness at Leadhills, a mountain district higher than the summit of the Pentland range, near Edinburgh, ought certainly to be a strong proof of the possibility of employing our pauper population with advantage to themselves, to the benefit of proprietors, and the general improvement of our country."

The remark of the *Scotsman* applies to other countries besides Scotland. Several of the lower ranges of hills in England do not ascend to the altitude of Leadhills, and in a lower latitude the region of profitable cultivation will necessarily ascend higher, and probably in proportion, *cæteris paribus*, to the range of isothermal lines, or to the height of the curve of congelation in that latitude.

"The Duke of Athol has ascertained that whilst the Scotch fir thrives only at an elevation below 900 feet in the north of Scotland, the larch ascends to 1600 feet, and may ascend higher." The same fact I have often observed at Leadhills, for there Scotch firs will not grow, and all other trees are stunted, excepting larches, which grow luxuriantly when protected. What a wide field for the cultivation of timber, both in England and Scotland, does not this discovery of the Duke of Athol's at once disclose? The unprofitable heaths of Scotland, when they are not cultivated, may be adorned with wood; and almost all the hills of England may have larches growing upon their summits. Instead of importing timber from other countries, we may then have more than we require; and thus obtain new resources, from being the exporting nation.

[*Magazine of Popular Science.*]

THE SEA SHELL.

Hast thou heard of a shell on the margin of ocean,
Whose pearly recesses the echoes still keep
Of the music it caught when, with tremulous motion,
It joined in the concert poured forth by the deep?

And fables have told us, when far inland carried,
To the waste sandy desert, or dark ivied cave,
In its musical chambers some murmurs have tarried
It learned long before of the wind and the wave.

Oh! thus should our spirits, which bear many a token
They are not of earth, but are exiles while here,
Preserve in their banishment, pure and unbroken,
Some sweet treasured notes of their own native sphere.

Though the dark clouds of sin may at times hover o'er us,
And the discords of earth may their melody mar,
Yet to spirits redeemed some faint notes of that chorus,
Which is borne by the blessed, will be brought from afar!

Barton.

It is well known that time once passed never returns, and that the moment which is lost, is lost for ever. Time therefore ought, above all other kinds of property, to be free from invasion; and yet there is no man who does not claim the power of wasting that time which is the right of others. This usurpation is so general, that a very small part of the year is spent by choice; scarcely anything is done when it is intended, or obtained when it is desired. Life is continually ravaged by invaders; one steals away an hour, and another a day—one conceals the robbery by hurrying us into business, another by deluding us with amusement; the depredation is continued through a thousand vicissitudes of tumult and tranquillity, still having lost all, we can lose no more.—Johnson.

THE MEDICINAL LEECH,

(*Hirudo medicinalis,*)

May be known by having six yellowish lines, or striæ, on its back, while the under part is of a greyish hue spotted with black; but, as we shall presently see, these markings are not uniformly found. The Medicinal Leech is common throughout the whole of Europe, but is much more abundant in the southern parts; it is generally about three inches in length. Formerly it was very abundant in Great Britain, but the improvements in agriculture, and the consequent drainage of the land, together with the great use made of it in medicine, have of late years rendered it of less frequent occurrence. On this account great quantities of leeches are imported; these chiefly come from Bordeaux and Lisbon.

The prevailing colour of the Medicinal Leech appears to vary according to the nature of the soil on which it is found. In Winter the Leech retires to waters of considerable depth, and seeks shelter in the mud at the bottom; but in the Summer it appears to delight in shallow pools, basking, as it were, in the warmth of the sun: but if the water it frequents is in danger of being dried up by the Summer-heat, the Leech buries itself in the mud at a considerable depth. Just before a thunder-storm, Leeches appear much agitated, and rise frequently to the surface of the water; this, therefore, is considered by the *leech-gatherers* as a favourable time for collecting them.

The property by which a Leech anticipates thunder, has induced some persons to employ it as a species of barometer; but its indications are very uncertain.

The Medicinal Leech appears during its whole life to exist on the blood or other juices of the creatures on whose body it fixes itself; this is not the case with the horse-leech, which lives entirely on the *larvæ* of aquatic insects, worms, &c.; so that the common idea of the danger of the bite of the horse-leech is without foundation.

The horse-leech is exceedingly voracious, not only swallowing worms, tadpoles, &c., but even preying upon its own species. Sixty-five horse-leeches were placed in a glass vessel, and in five days the number was reduced to fifty-two, and not a vestige of those that were missing was to be discovered.

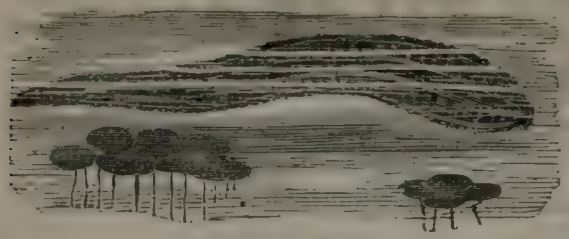
A number of this species of Leech, inhabiting the water that supplied a trough in which a tench had been placed, fixed themselves to different parts of the body of the fish, and so effectually was the poor tench annoyed, that it was soon deprived of life.

From these habits it would appear, that the name of Hirudo *sanguisuga*, (the blood-sucking leech,) has been improperly applied to the horse-leech; on this account a recent author has suggested the name of Hirudo *vorax*, (the voracious leech,) as being more suitable to its nature.

The teeth, or rather piercers, with which the Leech is furnished, are three in number, of a hard gristly substance, and so placed, with regard to each other, as to meet in the centre at equal angles; these piercers are thrust into the skin when the animal attaches itself; not by one plunging effort, but by constantly scratching or sawing upon the surface (assisted at the same time by the sucking action of the lips); in this manner they gradually become buried in the skin, and there remain as long as the creature retains its hold; this movement of the piercers occasions the gnawing pain felt for the first two or three minutes after the Leech has commenced operation.

Leeches are at times so scarce and valuable, that great care has been taken in preserving them in a healthy state and fit for use. The principal art in managing them consists in placing them in vessels

sufficiently large, keeping the water clear, and in removing those which are unhealthy as soon as they are discovered.



THE MEDICINAL LEECH.

Leeches, when applied to the skin, frequently show little inclination to bite, and many plans have been resorted to, to induce them to commence operations, such as bathing the part with milk, &c.; but these methods may be considered useless, and the best plan appears to be, to wash the part clean, and this is the more necessary when any embrocation has been previously applied; but the surest way is to puncture the place slightly, so as to cause the blood to appear. If the little surgeon, before it is fully gorged, appears lazy and unwilling to proceed, it can be usually roused by being sprinkled with a little cold water.

After a leech has fallen off, it is usual to sprinkle salt on it to induce it to disgorge the blood it has swallowed; but as the salt frequently blisters its body, it has been recommended by Dr. Johnson of Edinburgh, from whose work on the Leech, we have obtained most of the preceding information, to apply a small portion of vinegar to the head of the Leech, instead of salt.

It was long a matter of dispute as to whether Leeches were produced from eggs or born alive, but it is now ascertained that the ova are developed in a singular case, having some resemblance to the cocoon of a silk-worm. The following engraving represents this case, of its natural size: fig. 1. shows the perfect case or cocoon, and fig. 2. the same opened, with the young Leeches contained within it; it is said that, at times, there are as many as thirteen or fourteen in one case. This cocoon is formed by the parent animal, and by it deposited in the mud or clay which composes the bed of the pool it inhabits.

Fig. 1. Fig. 2.

The fact of the young Leech being produced from these cocoons, although only latterly ascertained by naturalists, was long since well known to the dealers in Leeches on the French coast, who avail themselves of this knowledge of their habits, to multiply them for the purpose of sale.

It was by these means the leech-dealers of Bretagne, and particularly in Finisterre, replenished the ponds in which they preserved those leeches which were intended for the Paris market.

About the month of April or May, according to the nature of the season, they send out labourers, provided with spades and baskets, to the little muddy marshes, where they are known to exist in abundance. These workmen then set about removing those portions of mud that are known to contain cocoons, which are afterwards deposited in sheets of water previously prepared for their reception; here the young leeches quit the cocoons, and are allowed to remain six months, when they are removed to larger ponds.

The subjoined graphic account of the mode of taking Leeches at another part of the French coast, is translated from the *Journal des Hôpitaux*:—

The country about La Brenne is, perhaps, the most uninteresting in France; the people are miserable-looking, the cattle wretched, the fish just as bad, but the leeches are admirable. If ever you pass through La Brenne, you will see a man pale and straight-haired, with a woollen cap on his head, and his legs and arms naked; he creeps along the borders of a marsh, among the spots left dry by the surrounding waters, but particularly wherever the vegetation seems to preserve the subjacent soil undisturbed; this man is a leech-fisher. To see him from a distance, his woe-begone aspect, his hollow eyes, his livid lips, his singular gestures, you would take him for a patient who had left his sick bed in a fit of delirium. If you observe him every now and then raising his legs and examining them one after the other, you might suppose him a fool; but he is an intelligent leech-fisher. The Leeches attach themselves to his legs and feet as he moves among their haunts; he feels their presence from their bite, and gathers them as they cluster about the roots of the bull-rushes and sea-weeds, or beneath the stones covered with green and glutinous moss. Some repose on the mud, while others swim about; but so slowly that they are easily gathered with the hand. In a favourable season it is possible, in the course of three or four hours, to stow ten or twelve dozen of them in the little bag which the gatherer carries on his shoulder. Sometimes you will see the leech-fisher armed with a kind of spear or harpoon; with this he deposits pieces of decayed animal matter in places frequented by the leeches; they soon gather round the prey, and are presently themselves gathered into a little vessel half full of water; such is the leech fishery in Spring.

In Summer the Leech retires into deep water; and the fishers have then to strip themselves naked, and walk immersed up to the chin. Some of them have little rafts to go upon; these rafts are made of twigs and rushes, and it is no easy matter to propel them among the weeds and aquatic plants. At this season, too, the supply in the pools is scanty, the fisher can only take the few that swim within his reach, or those that get entangled in the structure of his raft.

It is a horrid trade in whatever way it is carried on. The leech-gatherer is constantly more or less in the water, breathing fog and mist, and fetid vapours from the marsh; he is often attacked with agues, catarrhs, and rheumatism. Some indulge in strong liquors to keep off the noxious influence, but they pay for it in the end by disorders of other kinds. But with all its forbidding peculiarities, the leech fishing gives employment to many hands; if it be pernicious, it is also lucrative. Besides supplying all the neighbouring medical men, great quantities are exported, and there are regular traders engaged for the purpose. Henri Chartier is one of those persons, and an important personage he is when he comes to Meobecq or its vicinity; his arrival makes quite a fête, all are eager to greet him.

Among the interesting particulars which I gathered in La Brenne relative to the Leech-trade, I may mention the following. One of the traders, what with his own fishing and that of his children, and what with his acquisitions from the carriers, was enabled to hoard up 17,500 leeches in the course of a few months; he kept them deposited in a place, where in one night they all became frozen into a solid mass. But the frost does not immediately kill them; they may generally be thawed into life again. They easily indeed bear very hard usage. I am told by one of the carriers that he can pack them, as closely as he pleases, in the moist sack which he ties behind his saddle, and sometimes he stows his cloak and boots on the top of his sack. The trader buys his Leeches without distinction, big and little, green and black, all the same; but he afterwards sorts them for the market. Those are generally accounted the best which are of a green ground, with yellow stripes along the body.

A good conscience is more to be desired than all the riches of the East. How sweet are the slumbers of him, who can lie down on his pillow and review the transactions of every day, without condemning himself! A good conscience is the finest opiate.—Knox.

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THE NAVAL AND MILITARY ESTABLISHMENTS AT WOOLWICH.

THE ROTUNDA, OR REPOSITORY, AT WOOLWICH.

The town of Woolwich, at present so well known on account of its naval arsenal, was originally a small fishing village of little note. Its advantageous situation on the banks of the Thames, being only eight miles from London, and more particularly the great depth of the river at this spot, capable at all times of the tide of floating the largest vessels, have been the cause of its gradual increase in importance. These favourable circumstances were noticed as far back as the reign of Henry the Seventh, who had a large vessel built here, of a thousand tons burden. It was not, however, until the time of Henry the Eighth that any regular dock-yard was established at Woolwich. After his death the establishment was greatly increased by Queen Elizabeth, and since then it has been progressively improved and enlarged. In the reign of Charles the First, a large vessel was built, of 1637 tons burden, which was formidably armed, and superbly gilded: from its destructive powers, it was called by the Dutch, with whom we were then at war, the "Golden Devil."

Woolwich, up to the time of George the First, continued simply noted for its dock-yard; but in the reign of that monarch, the foundry for cannon was removed from Moorfields, where it had previously been carried on, to the Warren that adjoins the town. The cause of its removal was a dreadful accident, which occurred by the explosion of the moulds, which were in a damp state, at the time of filling them with the melted metal. From this time Woolwich gradually assumed the character of a naval arsenal.

The appearance of the town itself, at least of the older buildings, is far from prepossessing; that part, however, which adjoins Charlton and the common, must be excluded from this censure.

It is to the public buildings that Woolwich owes its importance. The dock-yard extends along the bank of the river, for a mile in length: it contains, besides the dwellings for the officers, a smithery, in which there are two steam-engines, one of twenty and the other of fourteen horse power, the largest being employed in working two large lift-hammers, weighing nearly four tons each; these are raised by machinery, nine inches at each stroke, from thirty to fifty times in a minute: these hammers are employed in forging large anchors, and other iron work connected with ship building; the smaller engine is attached to the blowing apparatus, by which the fires of the forges are excited.

There are two dry docks, one double, and several slips, in which vessels of the largest size are built. A large basin, 400 feet long, and 290 feet in breadth, is also within the enclosure of the dock-yard, together with a mast-pond, a boat-pond, and numerous store-houses, and other buildings necessary for the workmen.

To the east of the dock-yard is the royal arsenal. It contains within its boundaries 100 acres of ground, together with a canal which occupies the extent of forty-two acres. Nearly opposite the entrance is a handsome row of houses, for the accommodation of the officers connected with the establishment. The enclosure includes immense ranges of store-houses, containing warlike stores of every description, in such quantities as to astonish even those accustomed to sights of this description. Beyond the guard-house, which is a handsome building, is the royal brass-foundry, where brass guns only are cast; to the east of the foundry are workshops for engraving and boring the cannon. All the ordnance used by the East India Company, and in the merchant service, is sent here to be proved before it is taken into use. Adjoining these buildings are the workshops for the manufacturing of gun-carriages and military wagons of every description, with machinery, worked by steam-engines, employed in planing, sawing, and turning wood or metal. Rather to the north of the foundry is the laboratory, in which blank and ball cartridges, of every description, are manufactured; and grape, canister, and other destructive ammunition, of various kinds, are prepared: here, also, are to be seen, machines for proving the strength of gunpowder, and samples of the varieties used by different nations, with models of fire-ships, fireworks, muskets, and many other objects of the same description. In the open air, or under sheds, surrounded by the immense storehouses we have described, are iron ordnance of various calibres, arranged in double rows, extending for several hundreds of yards in length, together with gun-carriages, piles of shot, iron water-tanks, &c., in great profusion.

The canal, which is thirty-five feet in breadth, has along its banks ranges of wooden buildings, in which Congreve-rockets are manufactured. Near this spot is a saw-mill, in which large timber is sawn, by means of perpendicular saws, worked by steam. The same engine also gives motion to circular saws of various sizes, lathes for turning, &c.

The barracks for the sappers and miners is a short distance from the arsenal, and nearer to Woolwich Common; near to this is a grand depôt of field train artillery, ready to be embarked at a minute's notice, and furnished with ammunition and material of every kind.

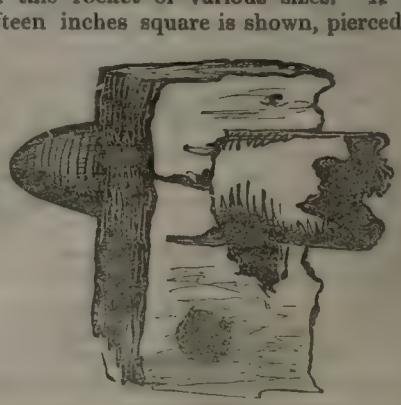
The barracks of the artillery form a splendid range of buildings, facing Woolwich Common; on the parade, in front of this building are several large and curious pieces of brass ordnance.

On the other side of the common, that is, opposite the barracks, is the Royal Military Academy, which was formerly established for instruction in the ordnance department, but is now used for the preparation of cadets for the East India service.

Looking westward from the parade in front of the barracks, the eye of the spectator is attracted by a curiously shaped building, in the form of a huge tent; this is the Rotunda or Repository, and contains numerous objects of curiosity and interest relating to the defence of the kingdom. The space surrounding this building is tastefully laid out in gravel walks and parterres, and contains within its enclosure, all the requisites for the instruction of the artillery in the practice of their formidable mode of warfare. There are model rooms containing drawings and models of implements of war, workshops in which experiments are made and new models constructed, and in the open air different kinds of fortifications are erected by the students, and all the details of the management of artillery are put in practice for the purpose of instruction, near an artificial fortification constructed of earth. On the left hand as you enter the grounds, the method of loading and firing the larger kind of ordnance, used in fortified places, is taught with all the attention to minutiæ which would be practised in the case of a siege.

The ground near this spot is beautifully diversified and irregular in its surface, and interspersed with several pieces of water; this condition of the ground affords excellent practice to the men, in dragging the guns up steep acclivities, or lowering them down rapid descents, forming pontoon bridges to transport them over water, and imitating all the operations of actual war. Round the entrance to the building many curious specimens of brass ordnance are seen; among them, two with three barrels each captured at the battle of Malplaquet, a village in the north of France.

The Rotunda was originally erected in the gardens of Carlton House, by order of the Prince Regent, for the entertainment of the allied sovereigns during their visit to England, in 1814; it is a circular apartment, one hundred and fifteen feet in diameter, with low walls, in which the windows that admit the light are placed. The roof, which is like the awning of a tent, is supported in the centre by a stately Doric column of freestone, the pedestal of which is decorated with various pieces of armour, and half way up the shaft, a complete suit of inlayed steel armour is placed. From the summit of the pillars strong gilded cords proceed to the circumference, and support the canvas roof, to the painting and repair of which, the most scrupulous attention is paid to preserve it against the effects of the weather. The stone column we have described was not in the original construction at Carlton House. Round the base are four collections of fire-arms, in the form of trophies, showing the gradual improvement of small arms during the last hundred years or more; among them is a carbine with seven barrels, and a French musket furnished with a percussion and a flint lock, either of which can be used at pleasure. The models of different fortifications which are placed in the area of the room, are exceedingly beautiful, consisting of the principal British dockyards, and their means of defence. The town of Quebec, in America, the rock and batteries of Gibraltar, and other celebrated places. Round these larger models, others of a smaller size are arranged, consisting principally of various inventions in naval architecture, such as the construction of a bomb-ship, the arrangements of a transport for the conveyance of horses, &c. Round the room, an enclosed space contains a vast series of models of various descriptions; among these are the different instruments and contrivances for firing the Congreve-rocket; these are accompanied by specimens of this rocket of various sizes. A piece of wood fifteen inches square is shown, pierced by one



EFFECT OF A CONGREVE ROCKET.

of these terrible instruments of war, as a proof of the great force with which they are driven.

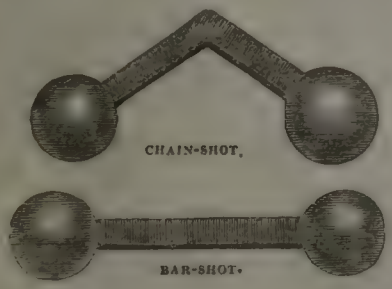
This rocket was first used at the bombardment of Copenhagen, and is so celebrated in modern warfare, that it deserves a more particular description.

The case of the Congreve-rocket is formed of iron instead of paper, and many advantages arise from this circumstance; the resistance of the air to its passage is less, on account of the combination of a greater weight, with a smaller diameter, so that the range of the missile is extended; the hard pointed end of the rocket also enables it to penetrate solid substances. The case of the rocket is formed of a cylinder of very soft iron, which is dovetailed together and soldered; if it is three inches in diameter, the thickness of iron requisite is but the fifteenth of an inch, and so in proportion. The inside of the case is lined with cartridge paper, pasted in. The pointed conical head is also of iron, but much thicker, and, according to the service it has to perform, is armed with hooks or otherwise.

The uses to which these rockets have been applied, are various; if they are intended to set fire to buildings, they carry with them a case containing highly combustible substances, which can be ignited after the lapse of any space of time, by means of a slow match; in other cases they are loaded with shells or grape shot, which, when they explode, commit dreadful havoc.

The distance to which a rocket will reach, of course depends on its weight and the charge with which it is loaded; it may be stated at from two to three thousand five hundred yards. In discharging the Congreve-rocket, metal tubes, fixed in a frame, are used: these tubes are of sufficient size to allow the rocket free motion. The inclination at which the tubes are placed directs the course of the missile; for these rockets are not fired perpendicularly, but in a slanting direction, according to the distance they are intended to reach.

Specimens of the different kinds of shot are found near these last: as *canister-shot*, consisting of a tin case, filled with a number of bullets or small round shot. *Grape-shot*, nine or more small round shot tied up in a canvas bag and corded round; the number of the balls being generally odd, gives the mass something the appearance of a bunch of grapes.



Chain-shot consists of two round shots linked together by a jointed bar of iron. *Bar-shot*, connected by a solid bar of iron, instead of one jointed. The two last are used for the purpose of dividing the masts and spars of an enemy; besides others of various forms and sizes contrived for the destruction of life. There are models, also, of several large cannon, one taken at Agra that weighed sixteen tons, and another at Beejapoor weighing forty tons. The models of gun-carriages are very numerous, from the rudest to the most perfect. Those representing the Russian artillery are accompanied by models of the horses by which they are drawn, and of the mode of harnessing them.

A BALLAD.

Sir Eustace sate, at midnight's hour,
Within his tent alone,
And the spell of memory's silent power
Was o'er his spirit thrown:
It bore him from Salem's leaguered wall
To her he had left in his castle-hall.

For Ermengarde, his only child,
The beautiful and young,
Had often at that hour beguiled
His spirit as she sung;
Bidding her father's heart rejoice
With the magic sound of her silver voice.

And on his harp he used to play
To her in that old hall;
He had brought his harp with him away,
But now 'twas silent all;
It hung in his tent by the cresset's light,
And his eyes as he viewed it with tears were bright.

That cresset's light grew pale and dim,
On his ear a sound there stole,
The echo of a dirge like hymn
Poured for a parted soul:
And the strings of that harp, which in silence slept,
As if by a spirit's hand, were swept.

He shed no tear, he heaved no sigh,
And not a word he said;
He knew, from that mystic melody,
Her soul from earth was fled:
So he threw by his lance, and sword, and shield,
And at break of day left the tented field.

He reached once more his castle hall,
He entered the chapel fair;
A marble tablet hung on its wall,
And a withered rose was there:
He knelt him down, and in silence prayed,
And died a monk in the cloister's shade.—Barton.

LIFTING OF THE KREMLIN BELL.

In the month of July, 1836, a successful attempt was made to raise the enormous bell which had been so long buried in the earth, in the Kremlin, at Moscow. This bell*, one of the wonders of Moscow, was cast in 1733, at the command of the Empress Anne, by a Russian founder, Michael Motorine. It is, according to Clarke, 21 feet 4½ inches high; at two feet from the bottom its circumference measures 67 feet 4 inches; its diameter at that height is consequently about 21 feet 6 inches. Its thickness, at the part intended to be struck by the hammer, 23 inches. The Russians estimate the weight at 12,000 poods, which is nearly 200 English tons. The reputed elegance of its form, the style of its bas-reliefs, and the richness of its metal, composed of gold, silver, and copper, contributed to make it remarkable as a specimen of the advanced state of the art of casting in Russia, at the epoch of its execution.

M. Montferrand, a gentleman greatly distinguished in Petersburgh by the numerous works he has executed, was intrusted with the direction of the operations. As the bell was lying in a cavity in the ground, and more than thirty feet below the surface, a large excavation was made to clear it. Over this was constructed a strong and lofty scaffold for the attachment of the blocks, and for the temporary suspension of the bell at a proper height. At half-past five in the morning, the authorities of Moscow, and a large number of spectators being assembled on the spot, prayers were offered up for the success of the attempt, and the operations commenced on a signal given by M. Montferrand. Six hundred soldiers instantaneously set-to at a large number of capstans. The enormous weight was mastered, and the bell was soon seen to rise slowly in the pit. Forty-two minutes elapsed during its elevation to the necessary height. No accident occurred. The first operation being finished, the next was to build a platform beneath the suspended bell. This was completed in eight hours, and the bell lowered upon it. On the following day it was placed on a sledge, and drawn by means of an inclined plane, up to the pedestal intended to support it, and there finally left, on the 26th of the same month.

This colossal work of art is, after all, but a mere curiosity. Its use as a bell is impossible, from a fracture, about seven feet high and two feet wide, in the lower part, where it is 23 inches thick. The cause of this gigantic injury rests entirely upon conjecture.—*Magazine of Popular Science.*

* See *Saturday Magazine*, Vol. III., p. 117.

WRITING MATERIALS.

No. VIII.

ON INKSTANDS.

PETRARCH'S INKSTAND.

THE above sketch will convey a tolerably correct idea of the beautiful Inkstand of Petrarch, whose genius and classical purity of mind diffused a lustre around him, which contributed greatly to promote the revival of learning, and the love of the arts and the elegancies of life, in the fourteenth century. We can fancy him composing some of his immortal poetry, or transcribing some of the manuscript works of minds congenial with his own, with the above Inkstand before him: thinking of the golden age of Augustus, of Horace, Virgil, and Ovid: thinking as they thought; imbibing a full draught from the same Pierian spring; enjoying similar honours, (for Rome crowned him with laurel and with myrtle,) and enduring similar pains.

I delight, (says Petrarch,) in my pictures; I take great pleasure also in images; they come in show more near unto nature than pictures, for they do but appear; but these are felt to be substantial, and their bodies are more durable. Amongst the Grecians, the art of painting was esteemed above all handicrafts, and the chief of all the liberal arts. How great the dignity hath been of statues, and how fervently the study and desire of men have reposed in such pleasures, emperors and kings, and other noble personages, nay, even persons of inferior degree, have shown, in their industrious keeping of them when obtained.

The fine arts and literature constituted the charm of his life. In reference to his books, many of which were transcribed by himself, the admirable art of printing not being then invented, he says,—"Great is my delight in beholding such a treasure. * * * * I have great plenty of books: where such scarcity has been lamented, this is no small possession: I have an inestimable many of books."

However much we should desire to linger on the character of Petrarch, we must forbear, and return to the subject of the present article. The possessor of the Inkstand of Petrarch, is Miss Edgeworth, a worthy owner of so great a treasure. It was presented to her many years ago, by one who justly estimated her rare talents, which were also employed to commemorate the gift in the following beautiful lines, entitled,—

PETRARCH'S INKSTAND.

By beauty won from soft Italia's land,
Here Cupid, Petrarch's Cupid, takes his stand.
Arch suppliant, welcome to thy fav'rite isle,
Close thy spread wings, and rest thee here awhile;
Still the true heart with kindred strains inspire
Breathe all a poet's softness, all his fire;
But if the perjured knight approach this font,
Forbid the words to come as they were wont;
Forbid the ink to flow, the pen to write,
And send the false one baffled from thy sight.

The discovery of the sepulchred cities of Pompeii and Herculaneum, has tended to throw much light on the domestic manners and customs of the ancient inhabitants of Italy. In the museum at Naples are preserved large quantities of domestic implements, and among the rest, of writing materials. The information they convey has already assisted us in the present series, and the following figures will give the reader an accurate idea of the Inkstands of the Romans.

Fig. 2 represents a double Inkstand, formed of two cylinders joined together; the one intended for black and the other for red ink: each cylinder is furnished with a cover. Near this stand lies the *calamus* or *reed*, cut to a point, which served the purpose of a pen.

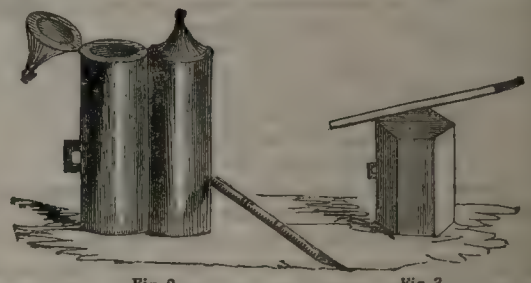


Fig. 2. Fig. 3.

Fig. 3 is a single Inkstand of a hexagonal or six-sided form, with a ring at the side to pass the finger through in carrying. Upon this is a sort of pen, but from the absence of knots or joints, it is probably a *stylus*.

Fig. 4 is a double Inkstand, with the calamus or reed-pen.

Fig. 4. Fig 5.

The above instruments, and others of their kind, are made of silver, lead, horn, wood, and other materials. In the twelfth century, and for a considerable time afterwards, the usual form of Inkstands was an inverted truncated cone. Rich stand-dishes have frequently been found among the relics of past ages. For several centuries horn was a favourite article in the manufacture of Inkstands; hence the term *inkhorn*, so common among old writers.

We come now to notice the Inkstands of our own time.

When good ink is once provided, it may appear to most persons to be a matter of indifference what description of vessel is employed to contain it, so as to answer the daily occasions of the writer. An Inkstand is, however, an important article among writing materials, since its office is, or ought to be, not only to hold the ink, but to preserve it from dust, and in such a state of limpidity as to allow of an easy flow from the pen, and to produce written characters of a uniform degree of blackness.

If dust be allowed access to ink, thickness is produced, a quality which never belongs to good ink. Thickness is also produced by exposure to the air, from another source, which is evaporation. The latter process depends for amount upon temperature; the liquid portion of the ink passing off in the form of vapour, in quantities proportionate to the heat of the room and the extent of liquid surface exposed. Now, as evaporation affects only the aqueous portion of the ink, and the solid colouring particles are suspended in a liquid medium which is constantly decreasing, a thickening of the ink, as it is called, is a necessary result. By continued evaporation the whole of the water will pass off, and the colouring matter will alone remain in the Inkstand, as a hard dry mass. This circumstance is pleasantly, but not quite correctly, alluded to by Cowper, in his Ode to Apollo, *on an Inkglass dried in the Sun.*

Ah why, since oceans, rivers, streams,
That water all the nations,
Pay tribute to thy glorious beams
In constant exhalations—
Why, stooping at the noon of day,
Too covetous of drink,
Apollo, hast thou stol'n away,
A Poet's drop of ink?

A very simple and efficient form of Inkstand is shown in fig. 5, in which ink may be preserved for several months without thickening. It consists of a glass bottle open only at s, where there is a small mouth large enough to receive the pen. This bottle is filled by inclining the closed part, A B, downwards, and pouring in the ink at s: the ink will displace a portion of air in the bottle equal to its own bulk, and will not overflow at s, on account of the atmospheric pressure balancing the liquid column in the bottle. In this example, evaporation is small, because the surface at s is small, and a very minute portion of the ink being exposed to dust, no thickening occurs. Bird-cage fountains are constructed on similar principles.

A few improved Inkstands have, of late years, been made the subject of patents. One of these, by Mr. Edwards, is a useful and elegant invention. It consists of an external cylinder of bronze, containing a cylinder of glass, in which an accurately fitting glass piston moves by a very ready adjustment: below this piston is the ink, imbibed by a quantity of loose hair or wool. From the lower part of the stand proceeds a tube and a conical cup, which is filled with ink by slightly depressing the piston, and thus the pan is supplied. When not in use, this cup can be emptied in an instant, by giving a slight upward motion to the piston, and the wool being relieved from pressure, re-absorbs the ink. Should any of the ink flow over the conical cup, it is received into a saucer below, and can be returned into the reservoir.

Mr. Doughty, the inventor of pens with ruby nibs, has contrived an Inkstand which is lined with India-rubber, to prevent the nibs of his pens being injured by striking against the glass of common Inkstands. For a description of his peculiar pens we must refer to our article on steel-pens.

One of the best forms of *portable* Inkstands is the subject of Messrs. Horsley and Cooper's patent, which affords a convenient and air-tight stand, and not liable to corrosion, as most portable Inkstands are. This object is effected by bringing into contact two circular disks of glass, the flat surfaces of which are perfectly plane. These are fixed at the centre to a bar of metal, placed across the mouth of the stand. Each plate has a hole large enough to admit the pen, and the stand is opened by sliding the upper plate upon the under one, so as to make the two holes coincide; and this coincidence is ensured by means of two studs fixed to the upper plate. The aperture is closed by sliding the unperforated part of the upper plate over the hole of the lower plate, and in this state the stand may be carried about in the pocket, or packed with linen and books, without any fear of leakage. The simplicity of this invention, and the ease with which it is opened and closed, justly entitle it to the highest praise that can be bestowed upon a portable Inkstand.

ON THE

LIGHT OF THE MARINE ANIMALS.

Light diminishes rapidly in passing through water. At a certain depth, the sun itself would be invisible, as if a plate of iron had been interposed. Experiments have been made to ascertain what thickness of water excludes all light; but as yet without success. But while these estimates refer to the full light of the sun, and as the light of a cloudy day, of twilight, and of night, are successively far inferior, there must be many and long periods in which darkness reigns at very small depths, since the quantity transmitted is proportioned to the intensity.

It is also familiar, that many fishes reside in the deeper parts of the sea, as is true of the Ling among others, and on the bottom, as occurs in the flat fishes; while, moreover, many are nocturnal, sleeping in the day, and seeking their food in the night. On the land, absolute darkness is a very rare occurrence, while the nocturnal animals have a peculiar provision for discovering their prey, in a large pupil and highly sensible nerve. But under the entire want of light, that must often exist in the sea, no such power could be a compensation; while in minor cases, the great velocity of these tribes, and the frequent consequent distances between the pursuer and the pursued, must also be an obstacle to distinct vision. Under any view, it must have been impossible to prey at night; since our own least visible light must be pure darkness, even near the surface.

Here then is a world without light, the habitation of myriads of the most active and rapacious animals of creation: often social, performing various functions, moving over great distances with the rapidity of birds, and, above all, provided with organs of vision. Did naturalists never reflect on such a world, or ask themselves how such pursuits were carried on in utter darkness? They had not thought on the darkness alone of that world: and when they knew it, and did not inquire how the inconvenience to its inhabitants was remedied, is it not because they too often forget to view creation as they ought, to inquire of intentions and final causes, to look higher, and think more deeply of Him who has neglected nothing essential to the good of his creatures? He who sees God, wise, beneficient, and governing, will find a clue to his studies, and the solution of his difficulties.

A remedy for the interception of the sun and the absence of light, was wanted: day could not be brought into the depths of the ocean, for the laws of

light forbade it! yet, to at least the mutual pursuit of its inhabitants, that was indispensable. It remained for Him who created the difficulty, to invent the remedy. I do not say that man might not have suggested it, though he seldom recollects that he knows nothing but what creation and its Creator have taught him,—often also apparently teaching him as specially as the insect, on whose instinct he looks down with contempt, while priding himself on his superiority of reason. But even if he could have imagined the remedy, it was boundless power alone that could have furnished it. And the Creator has done this by means, the nature of which we cannot comprehend; yet not more ignorant here than in all other cases of that local production of light, independently of the sun and of combustion, to which the vague term phosphorescence is applied.

The never-failing wisdom and power of the Creator have established an independent source of light beneath the ocean; and it has been disposed in the precise manner required to answer the intended purposes. The animal itself was to be seen amid utter darkness; and it is rendered luminous, or becomes, itself, a source of light. Nor can we doubt the design and the purpose here, when we find the provision universal and the purpose necessary, and when we also can conjecture of no other mode in which it could have been attained. The great pursuit of all animals is food, and the food has here been rendered luminous, that it might be discovered. But for this provision, the deep-residing fishes could not have found the means of existing at the bottom of the sea, and the night-preying ones would have been for ever helpless: while my own investigations have shown, that there are predatory kinds immoveably fixed to the bottom, at depths of 6000 feet, where darkness is eternal.

The truth of this view is confirmed by the effect of luminous bodies on fishes. Even in ordinary day-fishing, it is a brilliant object, not a definite form, or a fish, which is the subject of pursuit, and it is so especially, as might be expected, among the swift fishes. It is the bright silvery skin of the bait which is the attraction, and familiarly so in the mackerel, equally ready to seize a shining piece of metal or a brilliant feather. Thence, also, the use and effect of nocturnal lights in fishing: well known to our remote predecessors among the ancients, to the inhabitants of the Mediterranean, and even to savage nations; all profiting by that knowledge which we disdain or neglect. If adopted in the fraudulent salmon fishery, and there only, no one seems aware that the light, supposed to aid ourselves in seeing the fish, is in reality its bait. It is the object of pursuit, because it is the expected prey.

But this is not all of the Divine contrivance on this subject: while, if the object is the same,—the discovery of prey by the means of light, the mode of attaining that end is different, as there is some difference also in the nature of the prey itself. How far the chemical sources of the light might coincide or differ, we do not know: but the one at least belongs to vital action, while the other is engaged with dead matter.

In all the living marine animals, the light is brilliant, often of different colours, commonly confined to a certain portion, or organ; or, at farthest, to the surface, under the command of the will, and dependent on life, since it disappears at the death or capture of the subject, as the interior parts also show no signs of it. But shortly after death, the whole body becomes luminous, displaying a pale uniform light; and the luminous matter can be detached and diffused through water, while the living light cannot. This fact is familiar in our larders; and though commonly attributed to putrefaction, it commences long before this process, and even ceases as that is established. And if the purpose of this second contrivance is plain, so ought it always to have been. The dead animal, in this condition, is still food: by putrefaction it would be wasted, and might be injurious, as such matters are, in the atmosphere: it becomes an object of attraction under this new expedient, as it had ceased to be, in losing its former powers of producing light with the loss of its life. And the wisdom is not less shown in conferring this new property anterior to putrefaction: since it is then more valuable as food. Here, again, we see the utility of final causes in the discovery of truth: since naturalists had always considered this as a mere result of putrefaction, and thus given a false view of a fact in nature, from neglecting its Author.

Of the living lights we are even more ignorant than of the dead; since we cannot detach the luminous substance, if there be one, nor discover the organs by which it is produced. In the larger fishes, it seems to exist over the entire surface, as it is evidently the temporary produce of an act of volition; though it is not easy to judge correctly of the facts, as it is possible that the light around them may, partly at least, be produced by the disturbance of minute animals in contact with them. This, however, will not of itself explain the appearances: since, in that case, it should attend every movement, whereas it is but occasional, and is excited, among other things, by a noise or an alarm. And that the luminous property does not belong to the water itself, we are assured, by finding that it never exists unless animals are present; while if the crowds of the nearly microscopic ones are the cause of that general light which seems to have given rise to this error, so does it require an equally minute investigation to detect those hitherto almost unsuspected myriads. Seamen, knowing the difference between blue and green water, know also that the former very rarely contains such animals, and is as rarely luminous. With some noted exceptions in the ocean, it is on the shores chiefly, that we find highly luminous water prevailing.

I believe the power of producing light to be an universal property in the marine tribes; and that belief is confirmed by the fact, that I have never found a species, however microscopic, in which it did not exist. I except the shell-fishes, however; and if there are obvious reasons why the display should there be difficult, so must I plead ignorance of what is of no easy investigation. Yet the Pholades are known to be luminous, and the places of others are generally marked out by luminous parasites. But in all others of the marine animals which are not fishes, from the largest Medusa or Holothuria, down to the most minute Beroe, Cyclops, Vorticella, or Vibrio, there seems a particular point, or organ, adapted for this purpose, which, however, we cannot discover, as the light which is our only guide for it, disappears in that which is necessary for its examination; as also we cannot find any organs in many of these, beyond the stomach and ovaria, and the tentacula or other appendages. And the reason for this conclusion is, that in Medusæ of a foot in diameter, the light will sometimes not exceed a pea in size, though in others, as in the Cyclops very often, its brilliancy causes it to appear larger than the whole body. The colour of the light varies; it is sometimes snow white, or else of the electric blue, or of a greenish tinge, or reddish, or yellow, or even scarlet.

Such then is the true source of those often brilliant, sometimes terrific appearances, so frequently observed

at sea. Above a shoal of fish, an alarm will often excite a sheet of fire resembling submarine lightning. In the tropical regions, the surface of the sea sometimes resembles a plain of snow, from the same cause. The flashes occasionally seen under the water, are produced by the larger fishes; and the line of light which attends the descent of a rope, is caused by the disturbance of the minuter animals. The twinkling stars so common on our own coasts, are generally the produce of Medusæ; and whenever a light is lifted on an oar, it is easy to secure and examine the animal, so as to satisfy ourselves of the cause; while if that is as easily done on sea weeds, or shells, it is the more surprising that any mystery should ever have existed on this subject. The fearfully luminous appearance of the sea in storms, equally arises from the crowds of these animals thus brought to the surface, and kept in a constant state of agitation. Nor let the universality of this light, in any case, excite surprise. Had the water been examined, as it had not, we need not have supposed itself to be luminous, when it will be often found so teeming with life, as to be turbid, as if from diffused sand.

Inasmuch as the lights are an enticement to the pursuer, the whole effect, to the pursued, would be evil, were it not for that compensation which seems never wanting. The light is under the command of the animal; and the defence is, to obscure it. This is easily ascertained in those which we can separate and detain. If much irritated, or alarmed by the disturbances of the water, they extinguish the light, though it had long been shining steadily; while, when again producing it, a far slighter alarm suffices to obscure it, as if they were on the watch; as, after a repetition of those, it is permanently extinguished. This is obviously an instinct of defence, arising from the knowledge that obscurity is safety. If any of those animals are excited, by a needful curiosity, to display their lights, or if those are used as a guide for their own pursuits, as seems to be the case with the larger fishes under alarm, I know not that there is sufficient experience to determine this point. But it must not be objected to the preceding views, that the lights in question cannot serve the asserted purposes to the inferior marine animals, inasmuch as many are without eyes. Eyes are now known to exist in very many which were long supposed to be, in many other respects, also, of a more defective organization; and even where they are assuredly wanting, as in the Medusæ and Beroes, there is a perfect sense of the presence of a luminous object, since they pursue a moving candle as correctly as a fish could have done, and will crowd round the single opening for the admission of light which has been left in a darkened vessel.

[Abridged from Macculloch's *Proofs and Illustrations of the Attributes of God.*]

To live in the present day, unconscious of the effects of divine wisdom, so palpably displayed in every object that is presented to man's senses, betrays little less than an inexcusable, self-satisfied, ignorance.—Maund.

Nothing surely can be better adapted to turn man's thoughts off his own self-sufficiency than the works of nature. Wherever he rests his attention, whether on matter organized or unorganized, there he will discover convincing evidence of his own ignorance; and at the same time, the omnipotence of a first great Cause will be impressed on his mind, and influence his understanding.—Maund.

Gaming.—It is possible that a wise and good man may be prevailed on to game; but it is impossible that a professed gamester should be a wise and good man.—Lavater.

CIVILIZED LIFE.

A general diffusion of knowledge, owing greatly to the increased commercial intercourse of nations, and therefore to the improvements in the physical departments of astronomy, navigation, &c., is changing everywhere the condition of man, and elevating the human character in all ranks of society. In remote times, the inhabitants of the earth were generally divided into small states or societies, which had few relations of amity among themselves, and whose thoughts and interests were confined very much within their own little territories and rude habits. In succeeding ages, men found themselves belonging to larger communities, as when the English heptarchy was united; but still distant kingdoms and quarters of the world were of no interest to them, and were often totally unknown. Now, however, every one feels that he is a member of one vast civilized society, which covers the face of the earth; and no part of the earth is indifferent to him. In England, for instance, a man of small fortune may cast his looks around him, and say with truth and exultation, "I am lodged in a house that affords me conveniences and comforts which, some centuries ago, even a king could not command. Ships are crossing the seas in every direction, to bring me what is useful to me from all parts of the earth. In China, men are gathering the tea-leaf for me; in America, they are planting cotton for me; in the West India islands, they are preparing my sugar and my coffee; in Italy, they are feeding silk-worms for me; in Saxony, they are shearing the sheep to make me clothing; at home, powerful steam-engines are spinning and weaving for me, and making cutlery for me, and pumping the mines, that minerals useful to me may be procured. Although my patrimony was small, I have post-coaches running day and night, on all the roads, to carry my correspondence; I have roads, and canals, and bridges, to bear the coal for my winter fire; nay, I have protecting fleets and armies around my happy country, to secure my enjoyments and repose. Then, I have editors and printers, who daily send me an account of what is going on throughout the world, and among all these people who serve me. And in a corner of my house, I have books! the miracle of all my possessions, more wonderful than the wishing cap of the Arabian tales; for they transport me instantly, not only to all places, but to all times. By my books, I can conjure up before me to vivid existence, all the great and good men of antiquity; and for my individual satisfaction, I can make them act over again the most renowned of their exploits; the orators declaim for me; the historians recite; the poets sing; and from the equator to the pole, or from the beginning of time until now, by my books I can be where I please." This picture is not overcharged, and might be much extended; such being God's goodness and providence, that each individual of the civilized millions that cover the earth, may have nearly the same enjoyments as if he were the single lord of all.—Arnott's *Physics.*

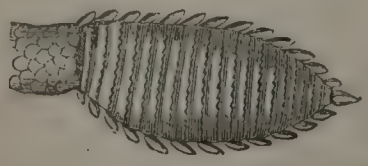
It is our grand fault, that we are affected presently according as everything appears in the face, and we stay not till it turn about and show us the other side. So the pleasures of sin deceive us, which come on with a beauteous countenance and smiling looks, with a painted face and flattering words, but go off again with blushing and shame, with pain and sorrow, and all the ugliness appears, when they have but turned their backs upon us. And so the cross accidents of the world do dismay us in such like manner, which come upon us with a sad and cloudy look, but have a bright side behind; and if we would but be patient till the shower or storm be over, we might behold the face of the sun breaking forth upon us.—Bishop Patrick.

FACTS IN COMPARATIVE ANATOMY.

No. VI.

FOOT OF THE GECKO.

WE well know the house-fly is capable of walking on the ceiling of a room, thereby supporting itself against the power of gravity; but there is an animal of a much larger size, which possesses the same power; namely, the Gecko, a small species of lizard, a native of the island of Java, which comes out of an evening from the roofs of the houses, and walks down the smooth, hard polished walls, in search of the flies which settle upon them, which are its natural food, and then runs up again to the roof of the house.



UNDER SIDE OF THE GECKO'S FOOT.

The foot of this lizard has five toes, at the end of each of which, except the thumb, is a sharp claw much curved. On the under surface of each toe there are sixteen transverse slits, leading to so many cavities, or pockets, the depth of which is nearly equal to the length of the slit that forms each orifice; they all open forwards, and the outer edge is notched like the teeth of a saw; on each side of the bones of the toe a large oval muscle is placed, connected with smaller muscular strings, which are attached to the pockets and their serrated edges; when these smaller muscles are brought into action, they pull back the notched edges, and the opening of the pocket is pressed against the wall; the muscles continue their action and open the mouths of the pockets, by that means enlarging the cavity and producing an imperfect vacuum. A provision similar to this enables that singular fish, the Echeneis, to adhere to the bodies of larger fish; and we have another familiar instance in the foot of the house-fly.

GREAT advantages are now afforded for self-instruction by the number of elementary books, executed with much ability for this very purpose. But there is one important caution which must always be borne in mind by the young or unsuspicious, without guide or friend to direct their choice of books, or give a hint where with *much* that is valuable, there may also be *some* that is far otherwise. It is a melancholy fact that great abilities and literary acquirements have not always been united with religion. Many, alas! have possessed them, and at the same time held infidel opinions. Of this number were Voltaire, Frederic the Second ("Great") of Prussia, many of the writers of the French Encyclopedia, &c. The "great" Earl of Chesterfield, whose letters to his son were at one time fashionable, inculcates polished manners, but pays no attention to *religion;* on the contrary, rather discourages it. Frequently, in works of a literary character, such men are mentioned with admiration, for their writings, their talents, or their learning; and any mention of their bad religious principles is omitted, either by accident or design. A young or unlearned reader may meet with the works of persons with whom he is *thus* only acquainted, and may unwittingly imbibe the poison they contain. When he has no means of ascertaining the *character* of his author, either from other books, or a religious and judicious friend, let him collect his *own* religious belief about him, and whenever he meets with what he cannot reconcile to it, let him consider himself on the brink of a precipice, and remember, that learning, though valuable, may be bought too dear. Without it, he may, by the grace of God, attain everlasting happiness; without religion, he cannot.—?

NOTHING IN NATURE LOST.

As we look around upon the world, we see that change is written upon all things earthly.

> . . . . . Day follows night, and night
> The dying day; stars rise and set, and rise;
> Earth takes the example; 'tis revolution all.

Flowers bloom but to fade; the leaves of Summer fall before the chilling blasts of Autumn. But chemistry teaches that what seems annihilation in all this, is but a change of form, and that, in the following seasons, the same elements, once possessed of life, will be combined anew, and bud and blossom in a renovated and more perfect shape. The race that expires, having marked the circle appointed by the Creator, prepares the bed in which a new generation springs up to regale the air and the earth with their beauty and their fragrance, and then give place in turn to other generations. Chemistry teaches that the dew-drop that glitters in the sun, and the passing cloud, and the morning mist, very emblems of evanescence and decay, though they vanish after a little season, yet are not lost, but re-appear in another type, to endure as long as moon and stars. Every drop of water that existed when the ocean was gathered into its place, is in existence now, either locked up in solid crystal, or floating in the cloud or mist, or concreted in the bodies of animals or vegetables, or congealed into ice or snow, or flowing in rivers, or piled up in the depths of the sea. Matter cannot be destroyed unless by that Power which gave it being; finite power can but change its form. The fire, which in cheering the social hearth, seems burning to destroy, is only transforming matter into new shapes.

Thus the pit coal, the remains, it may be, of the plants of an antediluvian world, and which for thousands of years has retained the elements of life locked up within it, gives them out once more under the influence of combustion. Its carbon, uniting with the oxygen of the atmosphere, assumes an aërial form, and its hydrogen, combining with the same principle, ascends in the form of invisible exhalation. This stream of vapour is gradually condensed into clouds, and falls to the earth in fructifying showers; and the carbonic acid gas, by other chemical agencies, is also brought down again, to hasten the growth of vegetables, enter into their systems, expand in their leaves, paint the gorgeous tints, and go abroad in the aroma of their flowers? What more beautiful than such a series of changes? The plants which adorned the earth in its early freshness, having slumbered for ages in lifeless masses of coal, again made active, and after warming in the fire, and cheering in the brilliant gas-light, and, as the generator of steam, setting a thousand wheels in motion for the maintenance of our race, recalled once more to the living world, to an appointed place among kindred plants, until it shall be the will of Him who created them to call them to their last repose.

THE authors of a fraud must preserve harmony, or they are ruined. But truth is always safe. Honest men are afraid of no disclosures.—P. S. DODD.

THE instability of friendship furnishes one of the most melancholy reflections suggested by the contemplation of human life; and few of us have travelled far upon our pilgrimage, without having had occasion to lament the loss of some companion who has parted from our side upon the first rumour that we have wandered from the fountains of the desert.—WILLMOTT.

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NEWCASTLE-UPON-TYNE, AND THE GREAT NORTHERN COAL-FIELD. No. III.

RIVER VIEW OF NEWCASTLE-UPON-TYNE.

GEOGRAPHICAL SITUATION — POPULATION — THE TYNE—MANUFACTORIES—THE COLLIERIES—RAILWAYS—BRIDGE OVER THE WEAR.

TURNING from the topographical description of Newcastle to its geographical situation, we shall find that few towns in Britain boast such natural advantages for profitable and extensive commerce. It stands 54° 58′ 30″ north latitude, and 1° 37′ 30″ west longitude, reckoned from the meridian of Greenwich. It is 273 miles N.N.W. of London, 117 S.E. of Edinburgh, 56 E. of Carlisle, 76 N.W. by N. of York, and 15 N. of Durham. In 1831 its population was 55,922, and that of Gateshead, 15,177, making a total of 71,099, but the number has increased very considerably since the census was taken. It is the chief port and market of a vast extent of country, there being no sufficient haven for ships of magnitude from the Humber to the Forth, except the Tyne.

This fine river is composed of two main streams, the North and South Tyne, whose confluence is about one mile to the north of Hexham; the former rises on the frontiers of Scotland, the latter on the borders of Cumberland. The Tyne does not become navigable for craft until it reaches Newburn, a village about five miles west of Newcastle. Vessels of 400 tons burden can come up to the town, and at all times ships of 300 tons and upwards may be seen at the quay. From Newcastle the river flows by a circuitous channel to the sea, which it reaches at Tynemouth, previously, however, forming at Shields one of the most convenient tidal and bar harbours which can be found in the world, affording ample accommodation for two thousand sail of ships. On a high rocky point at the extreme of Tynemouth Head are the remains of an ancient monastery, which forms a very conspicuous landmark; and doubtless, in ancient times, many a vow was made to its shrine by the distressed mariners, driven in stormy weather on the iron-bound coast of Northumberland.

The pride which the people of Newcastle take in their noble river, absolutely amounts to a passion; they speak of it with a warmth of affection which strangers can with difficulty comprehend; they celebrate it in their local songs, and a word said in its deprecation is resented as an insult. The keel-men, that is the men employed to carry coals down the river in lighters, which in the North are called keels, are frequently heard singing some of the songs written in honour of their stream. The following strain is sure to be heard by every visiter of Newcastle:

Tyne river running rough or smooth,
Makes bread for me and mine;
Of all the rivers north or south,
There's none like Coaly Tyne.
So here's to Coaly Tyne, my lads,
Success to Coaly Tyne;
Of all the rivers north or south,
There's none like Coaly Tyne.

It is not surprising that the people of Newcastle should be so fondly attached to their noble river, for it is difficult to describe the uninterrupted scene of activity and wealth exhibited along its banks from Newburn to the light-house at North Shields, a distance of seventeen miles. The whole line is a continued series of manufacturing and commercial establishments, many of which well deserve the attention of all who take an interest in mechanical or chemical science. The most remarkable establishments are the crown and plate glass-works, the lead-works, the Tyne iron-works of Lemington; the extensive founderies and engineering establishments of Messrs. Hawks, Losh, and Co., and of Stephenson and Hawthorn, where most of the locomotive engines used on British railways are manufactured. One of these,

now in the course of preparation for the Great Western Railway, is intended to run at the rate of eighty miles per hour, and is capable of being propelled at nearly double that speed. But the most peculiar feature of the landscape is the lofty chimneys of the chemical works, varying from 150 to 300 feet in height, which are constantly emitting copious volumes of smoke. Most of these have been erected since the duty was taken off salt, and are designed to separate the soda in that substance from the muriatic acid, so as to make it fit for the manufacture of soap. This new process has made a complete revolution in the soap trade; the use of kelp and barilla, which previously supplied the soda employed in the manufacture of soap, has almost totally ceased, and the export of soap, soda, and other chemical preparations from Newcastle, is very rapidly increasing, and promises to be a source of vast wealth to the inhabitants.

But the great staple export of Newcastle is coal, and its vast amount would be scarcely credible, were it not proved by official documents.

In 1836 upwards of two and a quarter millions of tons of coals were shipped coastwise from Newcastle; and in 1837, the number of tons was 2,385,192, being an increase of 119,424 tons on the former year. There were also exported to foreign countries and British settlements in 1836, 411,697 tons; and in 1837, 471,150 tons, being an increase of 59,453 tons, and making the total quantity in 1836, 2,686,465 tons, and in 1837, 2,856,342, approaching in round numbers to nearly THREE MILLIONS OF TONS OF COALS PER ANNUM shipped from the river Tyne.

The extent of the Newcastle Coal-field cannot be fixed with precision, but it may be generally described as extending from the Coquet on the north, to the Tees on the south, having an average breadth of twenty-one miles. Vertical sections of the strata differ so much from each other, that the strata of one bed affords no guide to the strata of the next; and the same beds frequently alter so much, that they can hardly be identified at comparatively small distances. The actual quantity of coal in the Newcastle field, does not amount, according to the best calculations, to more than a twenty-fifth part of the whole mass of strata; and of this several smaller seams will not pay the expense of working. The other strata are sandstones of various degrees of hardness, some of which are worked for building-stones. Interstratified with these are the shales, many of which are impregnated with bitumen; others consist of almost pure clay, and some, constituting the floor of certain seams, are used for the manufacture of fire-brick. The following estimate is generally regarded by the geologists in Newcastle as the nearest approximation to the proportions of the different mineral ingredients in the coal field:

The whole mass being divided into 100 parts;	
Of sandstone, or post-stone, more or less indurated, sometimes very fine grained, sometimes extremely coarse, one stratum especially being composed of large pebbles united by a siliceous cement, there are	36 parts.
Of strata in which siliceous earth still predominates, but unmixed with clay, though sufficiently hard to yield sparks on being struck with the miners' tools, there are	44 do.
Of strata that may more strictly be considered argillaceous, including the bituminous shales, &c.	16 do.
Of coal, as explained above, are	4 do.
	100

In the foregoing the ironstone is not noticed, being too small a ratio to the whole to be particularly specified. The iron pyrites met with in coal is employed for the manufacture of copperas; and occasionally small strings of galena occur in the fissures of troubles.

The irregularity of the strata is not the only disadvantage against which those engaged in mining operations have to contend; the seams are often interrupted by dislocations, which are significantly termed faults, hitches, troubles, or dykes; some of these entirely cut off the coal at particular points, either by throwing it out to the surface, or by burying it at hardly practicable depths. These dislocations, however, are not always injurious, for they frequently bring within reach beds of coal which could not have been procured without a very extravagant outlay.

In establishing, or, as it is called in Northumberland, "winning" a colliery, the great object is to sink the pits so as to profit by the natural inclination of the strata, so that future operations may be carried on towards a higher level, and the greater facilities afforded for the descent of water and the transit of coals under ground. Few persons are aware of the vast importance of all questions connected with the drainage in coal-operations. There are many mines from which far more water than coal is raised; but the quantity of water does not increase with the depth of the mine; the principal body of water is met at a distance of not more than forty or fifty fathoms from the surface. The following interesting particulars respecting water in the mines formed part of the communications made to the Geological Section of the British Association, and have been published in Richardson's *Companion to the Visiters of Newcastle.*

Mr. Buddle stated in evidence, before a parliamentary committee, that the weight of water lifted from a mine with which he was connected, was eighteen times that of the coal.

At Friars' Goose colliery the water requires three columns of pumps, sixteen inches and a quarter diameter each, raising upwards of 1000 gallons per minute, or above 6000 tons per day, whilst the weight of coals drawn varies from 250 to 300 tons per day.

During the attempted sinking of Haswell Pit through the sand beneath the magnesian limestone, the engine power employed drew feeders to the amount of 26,700 tons per day!

Yet it is not an uncommon circumstance to find the low main seam worked at a depth of 100 fathoms without any pumping apparatus, when the top feeders have been stopped or intercepted.

The water of the coal measures is often nearly pure, but sometimes it holds foreign ingredients in solution, one of which is sulphate of iron, but the most remarkable is common salt. The origin of the "brine springs," has never been explained. They are much salter than sea-water, and their abundant supply has occasioned the erection of salt works at Walker, Birtley, and Lambton. At St. Lawrence, a feeder has lately been raised from the strata above the low main coal, more than three times salter than the sea.

The mines vary very much in depth; that at Monk-Wearmouth is the deepest in the world. Very inaccurate accounts of it have been published, but the following particulars may be relied on. The shaft is 276 fathoms or 1656 feet in depth, (more than four times the height of St. Paul's in London,) and beneath this is a *sump*, or shaft, of 14 fathoms; making a total depth of 290 fathoms or 1740 feet, very nearly one-third of a mile. The temperature at the bottom in winter, averaged 87°, about 25° below the average surface-temperature. The weight of rope used in drawing the coals is nearly five tons.

The miners or pit-men are generally in comfortable circumstances; they make their engagements for a year, and during that period receive the use of a house and garden in addition to their wages; they are a healthy, long-lived race. From personal observation we feel justified in saying, that the pit-men are

generally an intelligent and moral race; many of them are skilful florists, and all take pride in the neatness of their houses and gardens. It is a common proverb in Newcastle, that no females make so good domestic servants as the daughters of pit-men.

Grindstones are a staple article of export from Newcastle; they are raised chiefly from a range of quarries to the south of Gateshead, and are sent to every quarter of the globe; upwards of 5000 grindstones were exported to foreign countries in the year 1836.

The district around Newcastle may be considered as the native land of railways; they have been used there for nearly two hundred years in conveying coals from the collieries to the river Tyne. The celebrated George Stephenson, so well-known for his success in the construction of locomotive engines, obtained his practical knowledge upon one of the colliery railways at Kellingworth. They have a very singular and picturesque effect when viewed from the Tyne, where they terminate. Their height above the river, and the mechanical contrivances by which the coals brought down in the wagons are shot into the ships, attract the attention of every traveller.

The following public railways are wholly or nearly completed.

1st. The railway from Newcastle to Carlisle. This great work unites the German Ocean to the Irish Sea; the distance is rather more than sixty miles, and it is traversed by the first-class trains in three hours. The road passes up the beautiful valley of the Tyne, and presents to the traveller a succession of picturesque views which cannot be rivalled by any railway in the kingdom. Greater advantages, however, are expected from this railway than it is likely to afford; the port of Carlisle is more than twelve miles distant from the town, and is small, dangerous, and inconvenient; while, as every body knows, the Firth of Solway is one of the most treacherous estuaries to the mariner in the world. It has been, however, proposed to establish a port at Annan Water, on the Scottish side of the Solway, by which the navigation of the worst parts of the Firth would be avoided.

2nd. A railway from North Shields to Newcastle. This very useful and important work exhibits in its execution unrivalled displays of mechanical skill, but none of greater value and importance than the magnificent one at Ouseburn and Willington. It would have been dangerous to construct stone bridges in a country pierced through in every direction by mining operations, and underneath which it was not impossible that more than one shaft might be driven. Iron bridges, however useful for ordinary traffic, would scarcely stand the concussion of locomotive engines coming with the speed of the lightning and the resistless force of the thunderbolt; wood, then, was the only material of which the architect could avail himself, and we shall give an abstract of the process of construction used in these viaducts, furnished by Mr. P. Green to the Mechanical Section of the British Association. The arches are laid on stone piers, and the great object aimed at in their construction, is to produce as great a distribution of stress as possible. The arches consist of three ribs, and every rib is put together with three inch thick deals, in length from twenty to fifty feet, and two deals in width. The first course is composed of two whole deals in breadth, and the next of one whole and two half deals, and this alternation is repeated eight times, layers of brown paper steeped in tar being introduced between each course, so that every rib is sixteen deals in thickness. No two of the horizontal or radiating joints are allowed to come together; the three ribs are connected by diagonal braces and bolts; and the spandrils are strutted in a peculiar manner, which it is difficult to explain by words. The Ouseburn bridge is composed of five noble arches, the three central arches being 116 feet span, the two others at each end 110 feet. The bridge at Willington Dean is composed of seven arches, the five middle ones being 120 feet span, and the two end ones 115 feet. The height of this bridge from the bottom of the dean or ravine, to the roadway, is 82 feet, and the entire length 1040 feet.

3rd. The Brandling Junction Railway, so named from its projector and principal manager, R. W. Brandling, Esq., is designed to unite South Shields and Monk-Wearmouth, with the Newcastle and Carlisle railway. In connexion with this we may mention the Stanhope and Tyne railway, intended to bring the mineral produce of the great coal field in the county of Durham, from the south side of the river Wear to the harbour of the Tyne, where the company's dock property is of the most extensive and valuable description. The Stanhope Company can produce at their docks seventeen shipping berths, at which more than half a million chaldrons of coal could be annually put on board. In order to form a communication with the South Durham coal-field, it was necessary to throw a bridge over the Wear, and this effort of human skill is one of the most surprising specimens of bridge architecture in the world.

The arch over the Wear is 160 feet span; the next arch on the north side 144 feet; and the two others each 100 feet. The length of the entire bridge is 810 feet 9 inches. Its width within the parapet walls 21 feet; and its height from the water 130 feet. On the bridge a double line of rails are laid, and there is on each side a flagged footway. The foundations, both from the abutments and piers are based upon the solid rock. The stone with which this gigantic fabric has been constructed is an excellent well-coloured free stone from Painshaw Quarry in the immediate neighbourhood, except the quoins of the two large arches, which are of granite; and though elegance and beauty are combined in all parts of the design, the structure presents altogether a degree of substantiality surprisingly formidable.

This bridge was erected by Mr. Gibb, of Aberdeen; it was completed on Wednesday, the 27th of June; and in commemoration of the coronation of her Majesty, was named Victoria Bridge.

Much has been said, especially in Scotland, of a railway from Newcastle to Edinburgh; but the project has not yet met with such support in this district, as to afford any hope of its being speedily carried into effect. It is, indeed, very probable that the projected railroad from Carlisle to Glasgow will supersede its necessity; for the railroad between Lancaster and Liverpool is nearly completed, and a railroad from Lancaster to Carlisle, a distance of not more than sixty miles, would at once bring Scotland and the North of England into the line with Liverpool, Manchester, Birmingham, and London. The only difficulty, the intervention of Shap-Fells, it has been recently ascertained, may be surmounted, without the necessity of a tunnel or even a very deep cutting. Should this work ever be completed, the beautiful lakes of Westmoreland and Cumberland will be brought within a short day's journey of the citizens of London, and a country scarcely inferior in picturesque interest to Switzerland, and far superior to it in its romantic and historical associations, opened to the humblest class of tourists.

THE PRIMROSE. (*Primula.*)

. . . . . And nere's the meek
And soft-eyed Primrose.—Hurdis.

Woods and groves are of thy dressing,
Hill and dale doth boast thy blessing.—Milton.

This delicately perfumed, and modestly coloured early blossom, is considered the emblem of early youth, and represents the age between child and womanhood.

. . . . . Pale Primroses,
That die unmarried, ere they can behold
Bright Phœbus in his strength.—*Winter's Tale.*

The generic name of this flower is derived from *primus*, it being one of the earliest flowers of the spring, and from thence the English name of Primrose, the French *Primevère*, and the Italian *Primavera*. The German name *Frühlings blume* has a similar signification. As we enumerate twenty distinct species of *Primula*, we shall confine ourselves to the *Primula vulgaris*, or common Sulphur-coloured Primrose, which has lent its name to distinguish a delicate pale yellow colour, slightly tinted with green.

In tracing back the nativity of flowers, we are greatly assisted by the mythological writings of the ancients; for without these records we should have pronounced them all as being the children of Nature; and the relationship which this favourite flower bears to the gods would have remained unknown, as well as the history of its origin. The Primrose was anciently called Paralisos, after the name of a beautiful youth who was the son of Priapus and Flora, and who died of grief for the loss of his betrothed Melicerta, but was preserved by his parents by being metamorphosed into this flower, which has since divided the favours of the poets with the Violet and the Rose. Clare says—

O, who can speak his joys when Spring's young morn
From wood and pasture opened to his view;
When tender green buds blush upon the thorn,
And the first primrose dips its leaves in dew.

And while he plucked the Primrose in its pride,
He pondered o'er its bloom 'tween joy and pain;
And a rude sonnet in its praise he tried,
Where nature's simple way the aid of art supplied

I did the same in April time,
And spoilt the Daisy's earliest prime;
Robbed each Primrose root I met,
And ofttimes got the root to set;
And joyful home each nosegay bore,
And felt—as I shall feel no more—*Village Minstrel.*

To crop the Primrose of the plains!
Does she not sweets in each fair valley find,
Lost to the sons of power, unknown to half mankind!
Shenstone.

And lanes in which the Primrose ere her time
Peeps through the moss that clothes the hawthorn root,
Deceive no student. Wisdom there and truth,
Not shy, as in the world, and to be won
By slow solicitation, seize at once
The roving thought, and fix it on themselves.—Cowper.

As some wayfaring man passing a wood
Goes jogging on, and in his minde nought hath,
But how the Primrose finely strow the path.
W. Browne.

There are some flowers that contribute to dispose us to a pensive or melancholy strain wherever we meet with them; whilst others seem equally to exhilarate the spirits and enliven the ideas. The colour and character of the flower may, in some degree, assist to make this impression; but it must principally be attributed to the remarks of the poets, as

Bring the rathe Primrose that forsaken dies.—*Lycidas.*

Sweet as the Primrose peeps beneath the thorn.

She is the rose, the glory of the day,
And mine the Primrose in the lowly shade:
Mine, oh! not mine; amisse I mine did say:
Not mine, but his, which mine awhile her made;
Mine to be his, with him to be for aye.
O that so faire a flowre so soon should fade,
And through untimely tempest fall away!
She fell away in her first age's spring,
Whilst yet her leafe was greene and fresh her rinde,
And whilst her branch fair blossomes foorth did bring,
For age to dye is right, but youth is wrong;
She fell away like fruit blown with the winde,
Weep, Shepheard! weep, to make my undersong.
Spenser.

Shakspeare makes it a funeral flower for youth—

. . . . . With fairest flowers,
Whilst summer lasts, and I live here, Fidele,
I'll sweeten thy sad grave: Thou shalt not lack
The flower that's like thy face, pale Primrose.—*Cymbeline.*

Although every lover of nature hails with pleasure the first appearance of the pale Primrose, seated on the hazel bank, surrounded by its puckered leaves, yet it fails to give those joyous sensations which arise at the first sight of the meadow "gay with gaudy Cowslips drest." The latter flower as forcibly brings to mind the frolics of our childhood, as the former reminds us of past friends and rural walks; for the soft tints of the Primrose, like the mild beams of the moon, seem to invite us on to moral reflections and quiet contemplation.

The Primrose is a native of most parts of Europe, always seeking the partial shade of hedge-rows, the banks of sheltered lanes, and the borders of woods or coppices, and is but seldom found spangling the open meadow, like its relative the Cowslip. From this we should learn to place it on the banks of our wilderness walks, and to scatter it thickly beneath the trees of the shrubbery. It will grow in almost any soil, but thrives most on a clayey bank. When transplanted in the Spring, it receives a check to its flowering, which often causes it to blossom freely in the Autumn.

The variety of the common Primrose, with double flowers of a lilac colour, forms a most agreeable contrast with the pale Primrose of the woods. The common Sulphur-coloured Primrose frequently changes its colour into a pale dingy red by cultivation; and we have sometimes met with it growing naturally of this colour, occasioned by some accidental circumstance analogous to cultivation, as either by the seed falling on strong manure, or rich earth being scattered over the plant. The medicinal properties of the Primrose are the same as those of the Cowslip, but of a weaker quality. We proceed to that beautiful and varied kind of Primrose so much esteemed in the gardens of florists under the name of

Polyanthos.

. . . . . Polyanthus of unnumbered dyes.—Thomson.

This beautiful variety of *Primula* derives its name from the Greek words *polus*, many, or much, and *anthos*, a flower, as the Polyanthos, like the Auricula, produces an umbel of many flowers on one common scape or stem; and on this account we consider it to be rather a variety of the *Primula elatior*, Oxlip, than that of the common Primrose, although Linnæus asserts that the peduncles in the common Primrose spring from a scape, which being so short is concealed among the leaves. Amongst a number of wild Primroses that were planted in Dr. Buxton's garden, at Maize Hill, near Greenwich, some of them produced flowers with a scape, and were thus transformed into Polyanthoses, retaining the colour of the Field Primrose.

The author has been a frequent planter of this

flower, but never observed this change, although the change of colour from the common sulphur to a red tint was frequent. It is probable that the Polyanthos may have sprung from both the Primrose and the Oxlip. Experience proves it to be a permanent variety; for however Nature sports with its tints, we have not known it return to either the common Primrose or the Oxlip.

The Polyanthos, which has been so much improved by cultivation during the last century, may justly dispute the prize of beauty with any European flower, when we take into account the variety and richness of its colouring, the grace and elegance of its form, its mild and agreeable odour, that has never been known to offend: its easy propagation, hardy nature, and early time of flowering, make it a welcome inmate in every flower-garden. and in no part of the world is it so successfully cultivated as in England, particularly by the zealous florists of Lancashire and Cheshire, who have, in the instance of this flower, left the Dutch bloemist considerably in the background. The neighbourhood of Manchester and Macclesfield is justly celebrated for producing the finest specimens of this flower, and in these manufacturing districts the criterion of a fine Polyanthos is ascertained with as narrow a scrutiny as the sportsman regards his pointer or setter dog.

The stem of a perfect flower must be strong, erect, and elastic, and of sufficient height to support the umbel or bunch of flowers above the puckered foliage of the plant. The footstalks of each separate flower should also be strong and elastic, and of a length proportioned to the size and quantity of the pipes; which should not be less than seven in number, that the bunch may be round, close, and compact. Maddox says, "the tube of the corolla above the calyx should be short, well filled with the anthers or summits of the stamens, and terminate fluted, rather above the eye. The eye should be round, of a bright clear yellow, and distinct from the ground colour; the proportions of a fine flower are that the diameter of the tube be one part, the eye three, and the whole pip six, or nearly so. The ground colour is most admired when shaded with a light and dark rich crimson, resembling velvet, with one mark or stripe in the centre of each division of the limb, bold and distinct, from the edging down to the eye, where it should terminate in a fine point. The pips should be large, quite flat, and as round as may be consistent with their peculiar beautiful figure, which is circular, excepting those small indentures between each division of the limb, which divide it into five heart-like segments. The edging should resemble a bright gold hue, bold, clear, and distinct, and so nearly of the same colour with the eye and stripes as scarcely to be distinguished; in short, the Polyanthos should possess a graceful elegance of form, a richness of colouring and symmetry of parts, not to be found united in any other flower."

A connoisseur in Polyanthoses scarce deigns a look of approbation on a pin-eyed flower, however brilliant its corolla. We think this distinction too refined, having frequently met with these outcasts of the garden that ought to have filled conspicuous situations, from the gaiety of their colours. The difference of the Rose and the pin-eyed flower consists in the anthers of the former being fixed near the top of the tube, and the pistil, being shorter than the tube, is therefore not seen; whereas in the pin-eyed, the pistil is so long as to reach the top of the tube, and the anthers are attached to the middle of the pipe, which swells out where the anthers are fixed.

Polyanthoses are increased by dividing the roots, or by slips, which should be taken off in the autumn. Indeed at this season all the roots should be taken up, divided, and planted into fresh earth; for, if suffered to remain over one or two years, they will degenerate and lose the greater part of their beauty. These favourite flowers of the Spring should be planted about six inches apart, and if about ten or twelve plants, all of the same variety, be placed in each clump, the effect will be more agreeable than when they are either planted singly or in regular beds.

The Polyanthos, from its hardy nature, will grow in almost any soil or situation; but to increase the size of the flowers, which forms one of the great beauties of the plant, care should be taken to give them such a mixture of earth as is most adapted to force them. Mr Hogg, who has grown these flowers in great perfection, says the Polyanthos requires a much greater portion of sandy loam than the Auricula, a very small quantity of rotten dung, and a little leaf mould, peat or heath-earth mixed with the loam. Justice recommends the following proportions: four parts of fine hazelly loam from a pasture, three parts of well-rotted cow-dung, or two of leaves that have turned to mould, and one part of fine white sand, well mixed together.

We recommend a border or situation in the garden for the Polyanthos that is shaded by shrubs from the afternoon sun: there let holes be dug about five inches deep, and of the size intended for the clumps, which should be filled up with the compost, and watered well the day before the roots are planted, so that it may not sink below the level of the borders, after the plants are put into the earth.

It is observed that plants which are raised from seed, flower much better than those taken from old roots; therefore it is desirable to save the seeds annually from the finest plants; and as it will be observed that some of the capsules ripen the seed much earlier than others, it is advisable to cut those off, and preserve the seed in the capsule, in a shallow drawer, placed in a dry and sunny situation, until the whole is ripe, which is usually found to be about the end of June. This seed should be sown under a wall or hedge, in a north aspect, taking care not to cover it too deep with earth, and the young plants may be transplanted about the same time in the following year, giving them gentle waterings in dry seasons. Some florists prefer keeping the seed out of the ground until December, and then sowing it in boxes, which are placed in situations to receive the morning sun, only, and particularly when the young plants appear, as one whole day's sun would entirely destroy them.

Snails and slugs commit great depredations on the Polyanthos plants during the spring months; they should therefore be carefully examined early in the morning, at the time these depredators make havoc. But a more dangerous enemy often attacks this plant during the summer months, and from its minuteness often destroys a whole plantation, before the cause is ascertained. This is the little red spider *acarus*, which forms its web on the under side of the leaves, where it multiplies with such rapidity as soon to devour and poison the whole plant, although the insect itself is scarcely visible without a magnifying glass. The first effect of its attack is observed by the leaves becoming yellow and spotted. When this is observed, the plants affected should be taken up, and soaked for two or three hours in a strong infusion of tobacco-water, and then replanted in a fresh soil, or compost, but by no means in the same situation, as there would be danger of there being many of these little spiders

left on the ground, which would immediately return to the plants. Maddock observes that "the red spider seldom attacks such plants as are in a state of vigour, or when the weather is cold and wet; it generally commences its depredations in the early part of summer, and continues them as long as the heat and dryness of the weather favour its existence: the juices also of the plants being then more viscous and saccharine, afford it more suitable nourishment than at any other season."—Phillips' *Flora Historica.*

PROGRESS OF THE ARTS AND SCIENCES.

Persons in general look at the magnificent fabric of civilized society as the result of the accumulated labour, ingenuity, and enterprise of man, through a long course of ages, without attempting to define what has been owing to the different branches of human industry and science; and usually attribute to politicians, statesmen, and warriors, a much greater share than really belongs to them in the work: what they have done is in reality little. The beginning of civilization is the discovery of some useful arts, by which men acquire property, comforts, or luxuries. The necessity or desire of preserving them leads to laws and social institutions. The discovery of peculiar arts gives superiority to particular nations; and the love of power induces them to employ this superiority to subjugate other nations, who learn their arts, and ultimately adopt their manners; so that in reality the origin as well as the progress and improvement of civil society, is founded in mechanical and chemical inventions. No people have ever arrived at any degree of perfection in their institutions who have not possessed in a high degree the useful and refined arts. The comparison of savage and civilized man, in fact, demonstrates the triumph of chemical and mechanical philosophy, as the causes not only of the physical, but ultimately even of moral improvement.

Look at the condition of man in the lowest state in which we are acquainted with him. Take the native of New Holland, advanced only a few steps above the animal creation, and that principally by the use of fire; naked, defending himself against wild beasts, or killing them for food, only by weapons made of wood hardened in the fire, or pointed with stones or fish-bones; living only in holes dug out of the earth, or in huts rudely constructed of a few branches of trees covered with grass; having no approach to the enjoyment of luxuries, or even comforts; unable to provide for his most pressing wants; having a language scarcely articulate, relating only to the great objects of nature, or to his most pressing necessities or desires, and living solitary or in single families, unacquainted with religion, government, or laws, submitted to the mercy of nature or the elements. How different is man in his highest state of cultivation; every part of his body covered with the products of different chemical and mechanical arts, made not only useful in protecting him from the inclemency of the seasons, but combined in forms of beauty and variety; creating out of the dust of the earth, from the clay under his feet, instruments of use and ornament; extracting metals from the rude ore, and giving to them a hundred different shapes for a thousand different purposes; selecting and improving the vegetable productions with which he covers the earth; not only subduing, but taming and domesticating the wildest, the fleetest, and the strongest inhabitants of the wood, the mountain, and the air; making the winds carry him on every part of the immense ocean; and compelling the elements of air, water, and even fire, as it were, to labour for him; concentrating in small space materials which act as the thunderbolt, and directing their energies so as to destroy at immense distances; blasting the rock, removing the mountain, carrying water from the valley to the hill; perpetuating thought in imperishable words, rendering immortal the exertion of genius, and presenting them as common property to all awakening minds,—becoming, as it were, the true image of divine intelligence, receiving and bestowing the breath of life in the influence of civilization. * * * *

The rendering skins insoluble in water, by combining with them the astringent principle of certain vegetables, is a chemical invention, and without leather our shoes, our carriages, our equipages, would be very ill made; the bleaching and dyeing of wool, and silk, cotton, and flax, are chemical processes, and the conversion of them into different clothes is a mechanical invention. The working of iron, copper, tin, and lead, and the other metals, and the combining them in different alloys, by which almost all the instruments necessary for the turner, the joiner, the stone-mason, the ship-builder, and the smith, are made, are chemical inventions. Even the press, to the influence of which I am disposed to attribute so much, could not have existed in any state of perfection, without a metallic alloy. The combining of alkali and sand, and certain clays and flints together to form glass and porcelain, is a chemical process: the colours which the artist employs to frame resemblances of natural objects, or to create combinations more beautiful than ever existed in nature, are derived from chemistry. In short, in every branch of the common and fine arts, in every department of human industry, the influence of this science is felt; and we may find in the fable of Prometheus taking the flame from heaven to animate his man of clay, an emblem of the effects of fire in its application to chemical purposes in creating the activity and almost the life of civil society. * * * *

I will readily allow that accident has had much to do with the origin of the arts, as with the progress of the sciences. But it has been by scientific processes and experiments that these accidental results have been rendered really applicable to the purposes of common life. Besides, it requires a certain degree of knowledge and scientific combination to understand and seize upon the facts which have originated in accident. It is certain that in all fires alkaline substances and sand are fused together, and clay hardened; yet for ages after this discovery of fire, glass and porcelain were unknown, till some men of genius profited by scientific combination, often observed but never applied.

It suits the indolence of those minds which never attempt anything, (and which, probably, if they did attempt anything, would not succeed,) to refer to accident that which belongs to genius. It is sometimes said by such persons that the discovery of the law of gravitation was owing to accident; and a ridiculous story is told of the falling of an apple, as the cause of this discovery. As well might the invention of fluxions, or the architectural wonders of the dome of St. Peter's, or the miracles of art, the St. John of Raphael, or the Apollo Belvidere, be supposed to be owing to accidental combinations. In the progress of an art from its rudest to its more perfect state, the whole process depends upon experiments. Science is, in fact, nothing more than the refinement of common sense making use of facts already known, to acquire new facts. Clays which are yellow are known to burn red: calcareous earth renders flint fusible,—

the persons who have improved earthenware made their selections accordingly. Iron was discovered at least one thousand years before it was rendered malleable; and from what Herodotus says of this discovery, there can be little doubt that it was developed by a scientific worker in metals. Vitruvius tells us that the ceruleum, a colour made of copper, which exists in perfection in all the old paintings of the Greeks and Romans, and on the mummies of the Egyptians, was discovered by an Egyptian king. There is, therefore, every reason to believe that it was not the result of accidental combination, but of experiments made for producing or improving colours.

Amongst the ancient philosophers many discoveries are attributed to Democritus and Anaxagoras; and, connected with chemical arts, the narrative of the inventions of Archimedes alone, by Plutarch, would seem to show how great is the effect of science in creating power. In modern times the refining of sugar, the preparation of nitre, the manufacturing of acids, salts, &c., are all results of pure chemistry. Take gunpowder as a specimen: no person but a man infinitely diversifying his processes and guided by analogy, could have made such a discovery. Look into the books of the alchemists, and some idea may be formed of the effects of experiments. It is true these persons were guided by false views, yet they made most useful researches; and Lord Bacon has justly compared them to the husbandman, who, searching for an imaginary treasure, fertilized the soil. They might likewise be compared to persons, who, looking for gold, discover the fragments of beautiful statues, which separately are of no value, and which appear of little value to the persons who found them; but which, when selected and put together by artists, and their defective parts supplied, are found to be wonderfully perfect, and worthy of conservation.

Look to the progress of the arts since they have been enlightened by a *system* of *science*, and observe with what rapidity they have advanced. Again, the steam-engine in its rudest form was the result of a chemical experiment. In its refined state it required the combinations of all the most recondite principles of chemistry and mechanics; and that excellent philosopher who has given this wonderful instrument of power to civil society was led to the great improvements he made by the discoveries of a kindred genius, on the heat absorbed when water becomes steam, and of the heat evolved when steam becomes water. Even the most superficial observer must allow in this case a triumph of science; for what a wonderful impulse has this invention given to the progress of the arts and manufactures in our country! how much has it diminished labour! how much has it increased the real strength of the country! Acting, as it were, with a thousand hands, it has multiplied our active population; and receiving its elements of activity from the bowels of the earth, it performs operations which formerly were painful, oppressive, and unhealthy to the labourers, with regularity and constancy, and gives security and precision to the efforts of the manufacturer. And the inventions connected with the steam-engine, at the same time that they have greatly diminished labour of body, have tended to increase power of mind and intellectual resources. Adam Smith well observes that manufacturers are always more ingenious than husbandmen; and manufacturers who use machinery will probably always be found more ingenious than handicraft manufacturers.

Porcelain has been spoken of as a result of accident. The improvements invented in this country, as well as those made in Germany and France, have been entirely the result of chemical experiments. The Dresden and the Sevres manufactures have been the work of men of science, and it was by multiplying his chemical researches that Wedgewood was enabled to produce, at so cheap a rate, those beautiful imitations, which, while they surpass the ancient vases in solidity and perfection of material, equal them in elegance, variety, and tasteful arrangement of their forms. In another department, the use of the electrical conductor was a pure scientific combination, and the sublimity of the discovery of the American philosopher was only equalled by the happy application he immediately made of it. In our own times it would be easy to point out numerous instances in which great improvements and beneficial results connected with the comforts, the happiness, and even life of our fellow creatures, have been the results of scientific combinations; but I cannot do this without constituting myself a judge of the works of philosophers who are still alive, whose researches are known, whose labours are respected, and who will receive from posterity praises that their contemporaries hardly dare to bestow upon them.—Sir Humphry Davy.

In young minds there is commonly a strong propensity to particular intimacies and friendships. Youth, indeed, is the season when friendships are sometimes formed, which not only continue through succeeding life, but which glow to the last, with a tenderness unknown to the connexions begun in cooler years. The propensity, therefore, is not to be discouraged, though, at the same time, it must be regulated with much circumspection and care.

Too many of the pretended friendships of youth are mere combinations in pleasure. They are often founded on capricious likings, suddenly contracted and as suddenly dissolved. Sometimes they are the effect of interested complaisance and flattery on the one side, and of credulous fondness on the other. Such rash and dangerous connexions should be avoided, lest they afterwards load us with dishonour.

We should ever have it fixed in our memories, that by the character of those whom we choose for our friends, our own is likely to be formed, and will certainly be judged of by the world. We ought, therefore, to be slow and cautious in contracting intimacy; but when a virtuous friendship is once established, we must ever consider it as a sacred engagement.—Blair.

Legitimate reasoning is impossible without severe thinking, and thinking is neither an easy nor an amusing employment. The reader who would follow a close reasoner to the summit and absolute principle of any one important subject, has chosen a chamois-hunter for his guide. Our guide will indeed take us the shortest way, will save us many a wearisome and perilous wandering, and warn us of many a mock road that had formerly led himself to the brink of chasms and precipices, or at least in an idle circle to the spot from whence he started. But he cannot carry us on his shoulders; we must strain our own sinews as he has strained his, and make firm footing on the naked rock for ourselves, by the blood of toil from our own feet.—Coleridge.

To instruct mankind in things the most excellent, and honour and applaud those learned men who perform this service with industry and care, is a duty, the performance of which must procure the love of all good men.—Xenophon.

For general improvement, a man should read whatever his immediate inclination prompts him to; though, to be sure, if a man has a science to learn, he must regularly and resolutely advance. What we read with inclination makes a stronger impression. If we read without inclination, half the mind is employed in fixing the attention, so there is but half to be employed on what we read. If a man begins to read in the middle of a book, and feels an inclination to go on, let him not quit it to go to the beginning. He may, perhaps, not feel again the inclination.—Johnson.

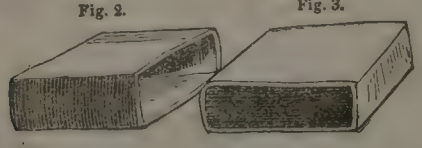
GOLD-LEAF BEATING.

Fig. 1.

The extraordinary malleable nature of Gold, which appears to have been known from the remotest antiquity*, together with its power of resisting the action of the atmosphere and of acids, have brought this valuable metal into more common use than its extreme rarity would otherwise permit. To render it available for the purpose of covering various substances, it is beaten into very thin leaves. The art of the gold-beater requires very great practice, and considerable manual dexterity, and in all its operations the greatest care is necessary to ensure the uniform thickness of the leaf when it is finished

The gold, which must be perfectly pure, is first cast into small bars, each weighing two ounces, of about three-quarters of an inch in width. The first operation is to extend these bars of gold in length, and to reduce them in thickness, by passing them repeatedly through a flatting mill, consisting of two equal-sized and highly-polished steel rollers; by this means the bar is extended in length, and necessarily reduced in thickness. The process of rolling hardens the gold, and to restore its malleability it is frequently heated to redness. The operation of rolling is continued until the riband of gold is so much reduced in thickness, that a square inch will weigh about six grains and a half. The first act of the gold-beater is to cut these ribands into pieces about an inch square. About 150 of these square pieces of gold are placed between as many of vellum about four inches square; the gold is placed as nearly as possible in the centre of each leaf, and about twenty extra pieces of vellum are placed at the top and bottom of the pile; the whole packet of leaves and gold are then strapped together to keep each in its place in the manner shown in the engraving. Fig. 2 is a band of strong parchment, into which, as shown in fig. 3, the packet of leaves is forced; this band or

Fig. 2. Fig. 3.



belt thus confines them in one direction: the packet thus partially confined is then forced into another strap of the same description, which crosses the first at right angles, and completes the confinement of the leaves.

The reduction of the gold squares in thickness is then effected by means of a hammer with rather a rounded face, about four inches in diameter, weighing from fifteen to sixteen pounds, and fixed to a short handle. The beating is performed on a block of black marble, or other hard stone (see fig. 1), about nine inches square and of considerable weight, the heavier the better: this marble block is embedded in a frame-work of wood about two feet square, its upper surface level with the top of the stone. Round three sides of this wooden frame a narrow ledge is raised, while the fourth side, opposite which the workman sits, is furnished with a leather apron, which the gold-beater places round him when at work, for the purpose of receiving any pieces of gold that may escape from the packet. The workman strikes fairly upon the middle of the packet, which he frequently turns over to beat the opposite side, but this he does in the interval between two strokes, without losing his blow. He keeps up a constant beating, and when fatigued with one hand, he dexterously changes the hammer to the other, whilst it is elevated in the air, and without any loss of time or force. The packet is every now and then bent or rolled between the hands of the workman, to give more freedom to the gold as it extends; and it is several times, during the operation, opened, to see how the work proceeds, and to shift the leaves which were in the centre to the outside of the packet. The beating is continued until the gold squares are nearly the size of the skins of vellum between which they are placed. They are then taken out, and each square is cut into four pieces by drawing a knife across it in two directions; these squares are again made up into packets, but instead of being placed between vellum as in the first instance, a substance called *Gold-beaters' skin* is employed, which is prepared from the intestines of an ox, made into pieces about five inches square. A smaller hammer is now used, and the beating is continued, the packet being more frequently rolled in the workman's hands, on account of the thin state to which the gold is now reduced. When the gold leaves by this second beating have reached the size of the gold-beater's skin, they are again cut into four, and again subjected to the power of the hammer: by this means they are extended to 192 times their original surface, each ounce of gold thus covering the space of one hundred square feet: but this is not by any means so thin as they may be made, for it is very practicable to extend an ounce to 160 square feet. The gold leaves are now cut exactly square by means of a small tool formed of two narrow slips of ivory fixed in a frame at a distance from each other equal to the width of the leaf, being lifted from the cushion on which they are cut by means of a pair of tweezers, fig. 4. They are then

Fig. 4.

made up into books, each containing twenty-five leaves of gold; the books are made of thin paper rubbed over with red chalk, to prevent the gold adhering.

* Among the remains of Egyptian art which have been handed down to the present day, many specimens of articles covered with Gold leaf are found.

Every human creature is sensible of the propensities to some infirmity of temper, which it should be his care to correct and subdue, particularly in the early period of life else, when arrived at a state of maturity, he may relapse into those faults which were originally in his nature, and which will require to be diligently watched and kept under through the whole course of life; since nothing leads more directly to the breach of charity, and to the injury and molestation of our fellow-creatures, than the indulgence of an ill temper.—Blair.

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A BRIEF HISTORY OF NAVIGATION. PART IV.

WAR-SHIP OF THE FOURTEENTH CENTURY. FROM FROISSART.

THE NAVIGATION OF THE MIDDLE AGES. PART II.

THE VENETIANS.

FROM the period at which we have now arrived, which is about the year 1200—the naval force of the Eastern empire gradually sank into insignificance, and never afterwards shone in an important light. An attempt was made by the Emperor Manuel to gain possession of Italy; but the little, and comparatively insignificant, republic of Venice showed itself more powerful at sea than the once mighty empire. From the time of that event no maritime undertakings of the Greeks are worthy of notice.

About this period the Crusades acquired a prominence in the history of Europe, which made the naval, as well as the military, strength of nations subservient to their object. These remarkable expeditions, it scarcely need be said, were sent out for the purpose of relieving the Holy Land from the subjection in which it had been placed by the Saracens, or followers of Mohammed. The nations which professed Christianity were emphatically called by the collective name of *Christendom;* and every nation of Christendom was called upon to send its quota to the general armament fitted out for the liberation of the Holy Land.

As the Holy Land could not be approached by land from Europe, except through the territory of the Eastern empire, and as the political relations of that empire with other countries did not always admit of its being made a military road from Europe to Palestine, it followed that the Mediterranean became the line of passage for the soldiers of the Cross; and thus a spur was given to the extension and improvement of naval operations.

In a former paragraph, we stated that the Normans, under Robert Guiscard, after having assisted the Sicilians, ingratiated themselves into their favour—and finally usurping all power among them, attacked the Eastern empire. The first attack was unsuccessful; but, subsequently, the empire was greatly harassed by the hardy Normans, who continually fitted out new armaments for the purpose of waging war against the Greeks. These proceedings greatly augmented the number of war-galleys in the Mediterranean; for the Greeks mustered their whole naval force to repel the advance of the Normans, and called in the assistance of the Venetians and other powers. At one time, it is stated that fifteen hundred Greek galleys were floating on the Mediterranean. Various fluctuations of fortune attended the two contending powers, and for a long series of years continual conflicts were carried on, generally in favour of the Normans. At last, however, when two or three of the vigorous and talented monarchs of the Normans had died, and left behind them none who could wield the sceptre with the vigour which had marked the career of Robert Guiscard and his immediate descendants, the Norman power declined in the Mediterranean; and a marriage between the daughter of William of Normandy, and a prince of the house of Plantagenet, caused the annexation of the Norman dominions to the crown of France, and the Eastern or Greek empire became released from their harassing attacks.

No sooner were the bravest of the new nations of Europe settled in their respective provinces, as the Franks in Gaul, the Goths in Spain, and the Lombards in Italy, than navigation and commerce, and the proper methods of managing these pursuits, came to be properly attended to. These nations had never hitherto regarded shipping, excepting for the transport of their forces. Some think that the French had a great hand, among the first, in restoring navigation; others that the Italians were the early revivers of navigation, commerce, and all the attendant arts. The Venetians had already become a people deserving of note. Their origin was remarkable. Venetia was anciently a province on the Eastern coast of Italy, containing upwards of fifty cities; but, when the barbarians, under Alaric, king of the Goths, and afterwards under Attila, king of the Huns, overran Italy, the Venetians fared miserably, and were driven from their homes and their country. They retired to a cluster of small islands, seventy-two in number, situated in the Adriatic sea, and there gradually formed a community which, in process of time, almost ruled the sea;

although for a long period they had no fence against the sea but hurdles,—no other food than fish,—no wealth besides their boats,—and no merchandise but salt. These islands were marshy, and separated only by narrow channels; but they were well screened, and almost inaccessible. They had been only the residence of fishermen, who had here supported themselves by trading in fish and salt. It appears that the *Veneti* (as they were called in Latin) or Venetians, did not think of making a permanent residence in these islands; so that they had not for a long time any body politic; but each one of the islands was for many years governed by its own chief, and formed a distinct state. When their commerce and foreign dealings had made them objects of jealousy to foreign states, they thought of combining for mutual safety: and this union was first begun in the sixth century of the Christian era, and completed in the eighth. Their fleets then, in the course of time, visited all the ports of the Mediterranean and Egypt, and other places where the produce of the East was usually brought. When the Venetians, by enterprise and perseverance, became a commercial people, they sent out galleys to accompany and protect their merchant-ships. These galleys were often splendidly fitted up: the bows or forecastles were covered with a platform, on which the soldiers, who were always the flower of the army, could stand, as on dry land, and direct their arrows with certainty. No other fleets were found so capable of conveying the vast armies of the Cross to the Holy Land, as those of Venice, which, in consequence, were much benefited by the employment.

Venice being built in the middle of the sea, on these small islands, there is no room for the passage of horses and carriages. Their streets are, in fact, *canals*; and, the houses being built close to the water, passengers are conveyed from one part of the city to the other by means of *gondolas*, and the men who serve in the capacity of conducting these vessels, are called *gondoliers*. They are light built, and beautiful in form; highly ornamented, and having the ends rising to a considerable height. In the centre is a small room for the company, which is handsomely fitted up. These vessels are painted black. As there is not width enough for oars in these canal-streets, the men use paddles; one standing at each end with his paddle, and looking *towards* the part he is going to. The gondoliers accompany the strokes of their paddles with suitable melody, which has always been admired when heard there, and also when told of in other climes.

VENETIAN GONDOLA.

Under Vitalis Micheli, the thirty-third doge of Venice, a naval armament was fitted out from Venice for the service of the crusaders, which showed the power and wealth of that community. Two hundred galleys were prepared, which, after vanquishing the fleet of the neighbouring republic of Pisa, attacked Ascalon in Syria, and captured it, as well as other towns. Under the next two doges, Ordelapho Faliero, and Domenico Micheli, similar armaments were fitted out, and met with so much success on the Eastern shores of the Adriatic, on the coast of Africa, and in the Holy Land, that the envy of the Greek emperors was excited, and a series of fierce engagements took place between them.

An event occurred in the time of the next doge, about the year 1177, which led to the Venetian ceremony of the "Doge marrying the sea." Pope Alexander, being threatened with a hostile attack from Frederick Barbarossa, solicited the aid of the Venetians, which was afforded. Barbarossa sent a fleet of seventy-five very large galleys, under his son Otho, to attack Venice itself; but the attempt utterly failed, and forty-eight of Otho's galleys were either sunk, captured, or destroyed. The pope, who had taken refuge at Venice, in order to signify his gratitude to the Venetians, presented the doge with a ring, and accompanied it with these words, "Take this ring, and present it to the sea, in token of your dominion over it. Enjoin your successors to perform annually the same ceremony, that succeeding ages may learn that your valour acquired this great prerogative, and has subjugated the ocean, even as a wife is subject to her husband."

This custom of the doge marrying the sea, was continued yearly for many centuries after this event. On Ascension-day in each year, the doge, the senators, the great lords and persons of quality, together with the foreign ambassadors, entered a splendid vessel, called the *Bucentaur*, which was fitted up with great elegance for the ceremony of marriage: it was gilt from the prow to the stern, and was covered over-head with a kind of tent, or awning, made of purple silk. When all the companions of the doge had sailed out into the open sea, in their gondolas, following the Bucentaur, the doge threw a gold ring into the waters, saying—"We marry thee, O Sea, in token of that true and perpetual dominion, which the republic has over thee."

The naval greatness of Venice soon afterwards received a still greater augmentation. The Eastern emperor having been deposed, his son solicited the aid of the Venetians, and of Baldwin, earl of Flanders, to reinstate his father on his rightful throne. Venice fitted out a large armament, consisting of sixty galleys, twenty ships of war,—the distinctive character of which is not precisely known,—and several transports. The object of the alliance was so far attained, that the usurper was deposed; but just at that crisis the old monarch died, and his son was murdered, so that Earl Baldwin was chosen emperor. In gratitude for the service which the Venetians rendered him in the course of these events, he gave them great privileges in his empire, and what was of more importance,—he permitted them to wage war against, and to gain possession of, the Greek islands in the Archipelago. Not only did the state itself engage in this attack on the islands, but private individuals formed themselves into communities or companies for the same purpose. The terms on which they joined were, that every person whose property amounted to a certain sum, should furnish a ship of a given description and force; and so, by a proportionate scale, that those who were more or less wealthy should furnish a quota according to their means. As the expense thus became a general, though private, concern, the profits resulting from it were proportioned according to each one's contribution. The result of these expeditions was, that the whole of the Greek islands became subject to the Venetians.

Shortly after this period, a fresh succession of naval engagements sprang up between the Venetians and the Genoese, the latter of whom, influenced by envy of the successes of the Venetians, strove to equal or to eclipse their formidable rivals. After a series of conflicts, the Venetians, under Dandolo, and the Genoese, under Doria, had a severe engagement, which terminated in the destruction of the Genoese fleet, and the capture of its commander. War after war followed, in which the Genoese gradually acquired an equality in naval greatness with the Venetians. It is not necessary for us here to follow the details of the sanguinary conflicts which took place in the Mediterranean in the thirteenth and fourteenth centuries; for there does not appear to have been any great improvement in the construction of the vessels during this period.

The people of Venice and of Genoa, then, have the glory of furthering the progress of navigation, and of giving it an impulse beyond what it had at any time previously acquired. For a long time, while the navy of England was in a very infantine condition, the English were supplied by the Venetians with articles of foreign produce. Soon after the Norman conquest, the Venetian vessels arrived regularly at Southampton, bringing Indian goods—silks, sugar, spices, aromatics, &c., which began now to be much used by men of rank. These were usually paid for in tin. In the course of time English ships traded to Lisbon; and were eventually fitted out for the Indian trade; that is, to meet the Arabian merchants, who brought the Indian commodities overland to the ports on the eastern parts of the Mediterranean sea. But Venetian pilots were long had in great request among the maritime nations of Europe.

On turning our attention again to Southern Europe, we meet with little but a succession of sanguinary wars

between the states which were on the decline, and new states, ambitious of rivalling their predecessors in power.

After the desperate struggles between the Venetians and the Genoese, a new power sprang up on the west of them. This was the kingdom of Arragon, which occupied a considerable part of Spain, Castile being the other part. The Arragonese soon acquired great influence in the Mediterranean; but it does not appear that either the form of their vessels, or their mode of navigation, presented any variation from those which had been observed by the Genoese, Venetians, &c.

It is a remarkable instance of the slow growth of naval power among military people, that the great Tamerlane, or Timour the Tartar, although he possessed all the country from the Irtish and the Volga on the north, to the Persian Gulf on the south, and from the Ganges on the east, to Damascus on the west, could not cross the Hellespont into Europe, on account of his not possessing a single galley; and as the Greeks of the eastern empire joined with the Turks of Asia Minor in preventing Timour from hiring any vessels, he was forced to abandon an intended attack on Constantinople.

Shortly after this event, the eastern empire became extinct, in consequence of the conquest of Constantinople by the sultan of the Turks, Mahomet II. In the course of the proceedings attendant on this memorable event, a remarkable stratagem was adopted by the Turks to bring their slender fleet near the walls of Constantinople, without encountering the superior fleet of the Greeks. Gibbon thus describes it:—"The genius of Mahomet conceived and executed a plan of a bold and marvellous cast, of transporting by land his lighter vessels and military stores from the Bosphorus into the higher part of the harbour. The distance is about ten miles, the ground is uneven, and was overspread with thickets. A level way was covered with a broad platform of strong and solid planks, and to render them more slippery and smooth they were anointed with the fat of sheep and oxen. Fourscore light galleys and brigantines, of fifty and thirty oars, were disembarked on the Bosphorus shore, arranged successively on rollers, and drawn forwards by the power of men and pulleys. Two guides or pilots were stationed at the helm or prow of each vessel; the sails were unfurled to the wind; and the labour was cheered by song and acclamation. In the course of a single night this Turkish fleet painfully climbed the hill, steered over the plain, and was launched from the declivity into the shallow waters of the harbour, far above the molestation of the deeper vessels of the Greeks."

Shortly after the capture of Constantinople by the Turks, the Venetians turned their war-ships into that quarter, and attempted to dispute the possession of the islands in the Mediterranean with them. The success of the attempt, however, was but small; and Venice did not again maintain the proud position which she once occupied among the Mediterranean states. Indeed there were but few events of a naval character which need occupy much of our attention, until the arrival of that most important era, when commerce began to take the place of war, and the progress of discovery opened a road to the introduction of Europeans to nations and countries before unknown.

During these ages, the missions undertaken to different parts of the world, by land and sea, in order to convert the natives to Christianity, conduced to the general improvement of the human race. The expeditions of travellers promoted the same beneficial end; and particularly the excursions of Marco Polo, the Venetian, who roamed over Asia for twenty-four years, and brought home wealth and varied information respecting the different countries of the East; which information, embracing, as it did, many things new and wonderful, was in a great measure disbelieved, and even burlesqued in the comedies of the times. Until the travels of succeeding visiters had confirmed the relations of Marco Polo respecting the countries of the East, his name furnished a nick-name for a bombastic character.

THE PORTUGUESE AND SPANIARDS.

Henry, thy ardent mind first pierced the gloom
Of dark disastrous ignorance, that sat
Upon the southern wave, like the deep cloud
That lowered upon the woolly skirts, and veiled
From mortal search, with umbrage ominous,
Madeira's unknown isle. But, look! the morn
Is kindled on the shadowy offing; streaks
Of clear cold light on Sagres' battlements
Are cast, where Henry watches, listening still
To the unwearied surge; and turning still
His anxious eyes to the horizon's bounds.
A sail appears, it swells, it shines: more high
Seen through the dusk it looms; and now the hul
Is black upon the surge, whilst she rolls on
Aloft,—the weather-beaten ship,—and now
Streams by the watch-tower! BOWLES

We have often spoken of, and alluded to, the trade with India. This, from its lucrative nature, was always an object of desire with the several nations of Europe which had any means for putting shipping into use; which it was necessary to be prepared to do to a great and expensive extent, owing to the distance and difficulties to be encountered. After the Arabians of Asia, and the Venetians of Europe, the Portuguese early distinguished themselves by pushing out into unknown seas, improving thereby their commercial condition, and the geographical knowledge of the world.

It is supposed by many, that if ancient Carthage had not been so ruthlessly swept away from the earth by the Romans, the Portuguese would not have had the honour of opening to us the southern seas, nor the Spaniards of disclosing the varied features of the New World. But, from the time of the Carthaginians, until after the Crusades, there was no material improvement in the practice of navigation, nor in the art of ship-building. Soon after the Crusades the properties of the magnet were discovered, and above all, in course of time, its *polarity*; that is, its tendency to set itself with one of its ends pointing northward, and the other southward; so that it is said to be conformable with the magnetic meridian. The especial benefit derived from this instrument was, that the mariners could now leave sight of land; and would know, by inspection of the needle, what quarter of the horizon the ship was making for, whether by day or night, and under any condition of the weather: for, before this, if they left the land, the direction of the vessel could only be regulated by the heavenly bodies; and they were so bewildered in bad weather, that they often imagined they should be pitched off, in a storm, into the dark abodes of Erebus and Night.

It appears, by certain historical glimpses which we are enabled to obtain, that not only the magnet, but also the *needle*, which is only a magnet of a regular, slender, and easily-moveable shape, suspended on a pivot, for the sake of turning round the more easily to the various points of the horizon, was known to and used by the Chinese on land. They do not appear to have used it for marine purposes. The like may be observed respecting the Arabians. If they were in the habit of using the compass by land, they do not appear to have thought of applying it to their passage over the seas; and most of their voyaging was found to be merely coasting, even in the sixteenth century. The Portuguese, when they first visited the Indian seas, found that the Arabians, whose vessels chiefly traversed those waters, steered wholly by observation of the stars or of the land, and that they were quite ignorant of the compass. But it has, however, been supposed by many learned and acutely-thinking men that the germs of art and knowledge existed in the eastern regions of the world, while the western were a silent desert, or only in a state of barbarism; but that these germs of art and knowledge never in many cases received any practical value, and in others, any high degree of cultivation, until they fell under the notice of the exciting genius of the West.

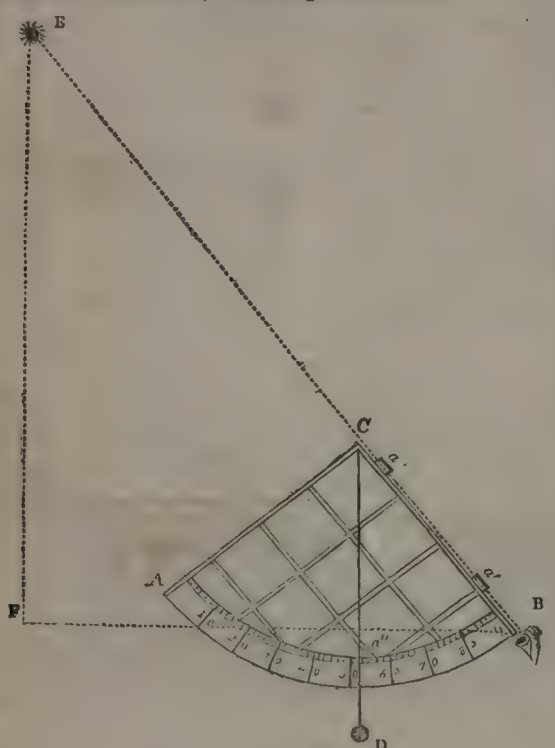
In the early part of the fifteenth century, John the First, king of Portugal, had effected some very important conquests over the Moors; in which he had been very materially assisted by his son, Prince Henry*, who, being an able and active-minded cavalier, took delight rather in the more solid glories of learning and science, than in the fame of war, in which he had, however, of late so highly distinguished himself. Upon the cessation of hostilities he retired to the promontory of St. Vincent, and lived at the sea-port town of Sagres, which he had himself founded, where he cultivated the science of Astronomy, for the purpose of making it available to the mariner, in guiding him over the ocean, when he had quitted the servile tracking of the shore. He, in fact, established a naval college, and an observatory. He engaged to his assistance all the best-informed men of his time; and the point to which he especially directed his attention, was the practicability of sailing round Africa, and of thus reaching the East Indies. His ideas respecting the

* The poet addresses this prince in the quotation that we have given in the preceding column. The writer takes this opportunity of acknowledging the respect and admiration which he feels towards the highly-gifted and venerable poet, in whose society he has passed some delightful hours.

accomplishment of this project had been awakened, or enlarged, by intercourse with some well-informed persons at Ceuta, a town on the coast of Africa, opposite to Gibraltar, whither his father's military proceedings against the Moors had carried him. Prince Henry did not live to see the whole of his views accomplished; but the many minor discoveries which were effected under his auspices, laid up a fund of knowledge and experience for succeeding navigators to profit by. Maps were formed under his superintendence; by which means all the geographical knowledge respecting the earth was brought together; the different parts were marked out; and the rocks, coasts, and quicksands to be avoided, were all noted down. Now also was first invented and brought into use the *astrolabe**, the original of the quadrant

> That sage device, whose wondrous use proclaims
> Th' immortal honour of its authors'† names,
> The sun's height measur'd.——

It was an arch, to the extent of a quarter of a circle, such as A B; and the rim was divided into degrees and half-degrees. Its primeval use was to take the altitude of the North polar star, in order to determine the latitude of a place, which is its distance North or South from the Equator; for which purpose a plummet, C D, was suspended by a string from the centre of the instrument, C, and thus the angle of elevation of the heavenly body was marked. An eye at B, sees the star E through the sights *aa'*; to make which observation the whole instrument must be so raised upwards, that the plumb-line C D shall fall vertically upon the quadrantal arc A B. The arc included between A and *a''* is the angular elevation of the star E; or the angle E B F=51°



THE ASTROLABE, OR QUADRANT.

To a person situated at the equator, the polar star will appear in the northern horizon. In proportion as he advances northward, this star will gain in altitude; so that when he shall have arrived at the pole itself, the star will be vertical to him; the pole being 90° north of the equator: hence the latitude of the place corresponds (nearly) with the altitude of the polar star. These observations would of course only serve for places in the northern hemisphere; as, on the southern side of the equator, the polar star would be below the horizon. In the early stage of nautico-astronomical science, these considerations were sufficient for navigators; but now, to determine the latitude of a place accurately by an altitude of the polar star, corrections must be made for this star s not being precisely vertical to the pole, but describing a small circle round it, owing to the diurnal revolution of the earth. Tables and other nautical instruments were also at this time constructed for the use of the sailor.

The southernmost cape of Africa known in those days was Cape Non, which received this appellation from the idea that it was utterly impossible to get beyond this cape; but the officers of Henry having at length doubled it, found Cape Bojador in the distance, whose violent currents and raging breakers, running for miles out to sea, seemed a barrier which could not even be approached with safety by mariners, who were in the habit of coasting along the shore. Seamen now began to be more alarmed than ever at the idea of the torrid zone, and to propagate the notion, that he who should double Cape Bojador would never return. At length this awful cape was passed by; the region of the tropics was penetrated, and divested of its fancied terrors; the river Senegal was observed, the greater part of the African coast, from Cape Blanco to Cape de Verde, was explored, and the Cape de Verde and Azore Islands were discovered; the Madeiras and Canaries having been visited for the first time by the Spaniards some years before. This prince died in the year 1473; after having obtained a papal bull, investing the crown of Portugal with sovereign authority over all the lands it might discover in the Atlantic, to India inclusive.

Many of the inhabitants of the African coast felt the most curious sensations of astonishment and fear at the sight of the vessels, which probably for the first time had reached their shores. When they first saw the ships under sail, they took them for large birds with white wings, that had come from foreign countries; but when the sails were furled, they thought, from the great length of the vessels, and from their swimming on the water, that they must be great fishes. Others believed that they were spirits that wandered about by night; because they were seen at anchor in the evening at one place, and would be a hundred miles distant by the morning. Not being able to conceive how anything human could travel more in one night than they could in three days, they set down the European vessels for denizens of another world. "There is no man ignorant," says Sir Walter Raleigh, "that ships, without putting themselves out of breath, will easily outrun the soldiers that coast them." "A fleet of ships may be seen at sunset, and after it, at the Lizard; yet by the next morning they may recover Portland; whereas an army on foot shall not be able to march it in six days."

A spirit of discovery, and a hope of gain through commerce, was certainly the real and avowed object of the Portuguese in venturing into these unknown seas and regions of horror. But it seems that, in all the early pursuit of art and science, the *romantic* was always mingled with the *actual* and *substantial*, owing to partial knowledge; which taste for the romantic filled up the picture, when true knowledge was wanting. The adventurers in the expedition just alluded to, and in several subsequent ones, hoped to open an intercourse with a prince or personage, of whom they had often heard much, under the mysterious title of *Prester John*. This singular name, it is said, was first introduced by travellers from eastern Asia, where it had been applied to some one of the early Christian bishops, who held there a sort of sovereignty; and as soon as a rumour was heard of a Christian king of Abyssinia, he was concluded at once to be the real Prester John. The geographical relations of the African continent not being then well understood, it was supposed that ambassadors from the western coasts might very easily reach his capital. It is not known what was expected at meeting with this phantom of glory, which always seemed to recede as they approached it; but there seems to have been a decided impression on the minds of the Portuguese, as in the case of the Arabs, who sought for Gog and Magog, that their nation would be raised to an exceeding height of power and glory, if they could discover the abode of this potentate. Hence, instructions were given to all officers employed in the African service, to endeavour in every quarter, and by every means, to accomplish this grand discovery. They accordingly never failed to question all whom they met on the coasts about Prester John, whose name, they were told by the natives, had never been heard of. They then besought the people whom they saw on the coasts, to inquire up the country for Prester John; promising large rewards to any who should give information, which might lead to success.

A correspondence between the king of Benin, which is situated on the west of Africa, a little north of the equator, and the king of Portugal, John the Second, led the latter to suppose that the real Prester John had been at last dis

* A word formed from the Greek, implying to *take* the height of the *stars*.

† Two Jewish physicians, named Roderic and Joseph.

NORMAN VESSEL.

covered. The negro ambassador of the king of Benin informed the king of Portugal that about 600 or 700 mi es east of Benin, there was a mighty king, called Ogané, who was held, by the pagan chiefs of that country, in the same veneration that the Pope was held in by the sovereigns of Europe. They further stated that, at the death of the king of Benin, his successor had to send ambassadors to Ogané, with presents, desiring to be confirmed in his kingdom, as the lawful heir. The pontiff Ogané sent him, in return, a staff and a brazen helmet, for a sceptre and crown; and also a brass cross for the neck. If the king did not receive these ensigns of his dignity, he would not be regarded as king by the people. This Ogané was never seen; a silk curtain being always suspended before him; and, when the ambassador was about to retire, a foot was protruded from the curtain, to which foot they would do homage, as to a holy thing. The ambassadors were then, upon their departure, likewise presented with small crosses. Many other curious stories have been handed down to account for the origin of, and to show what was meant by, this John the Priest and his kingdom.

As a specimen of the exploits of this hero, we are told that, when the Mongol army marched against the Christians of the Greater India, which was governed by Prester John, he "caused a number of hollow copper figures to be made, resembling men, which were stuffed with combustibles and set upon horses, each having a man behind on the horse, with a pair of bellows to stir up the fire. At the first onset of the battle, these mounted figures were sent forward to the charge; the men who rode behind them set fire to the combustibles, and then blew strongly with the bellows; immediately the Mongol men and horses were burnt with wild-fire, and the air was darkened with smoke. Then the Indians fell upon the Mongols, who were thrown into confusion by this new mode of warfare, and routed them with great slaughter."

After several other voyages, in which more of Africa was explored than had hitherto been known, Bartholomew Diaz, having been appointed to the command of an expedition at the end of the fifteenth century, succeeded in doubling the most southern promontory of Africa, which, in consequence of the storms and tempests he had endured in sailing round about in those parts, he called the *Stormy Cape*, but which the king of Portugal, at his return, called the *Cape of Good Hope*, in order that future navigators might not be alarmed by the inauspicious title given by Diaz, and that the new appellation might seem to give tokens of the advantage to accrue to those who should follow up the endeavours of the sailors of the day.

It has been well remarked, that "enterprises of a bold character remain often suspended until some man appears who is fitted to carry them into execution." Thus it was with the voyage to India. It was not accomplished till some time after; when Vasco de Gama, in the year 1497, not only doubled the Cape of Good Hope, but having then steered eastward, for the first time led the Portuguese into the Indian seas; and thus established a communication with India, which was kept up long after, and conduced alike to the increase of a knowledge of the world, the advantages of commerce, and an enlargement of the nautical art.

In this voyage the dreadful disease of the *scurvy* first manifested itself; or, at least, is first mentioned in connexion with sailors, which scourge seems to have followed them ever after. It results chiefly from mode of life and quality of diet, and is soothed or removed by attention to these particulars. It has been the chief object of solicitude to modern surgeons at sea, who have met the disease with considerable success. Captain Cook was the first who rightly treated this disease: he led the way to those numerous improvements in the health and comfort of the modern sailor, which place him in so vastly superior a situation, compared with that of the sailor previous to the time of this great captain.

The New World had at this time just been laid open to the enterprise of Europe; and thus the Peninsula, which comprises Spain and Portugal, was enriched and ennobled among the nations of the West. Vasco de Gama again doubled the Cape in the year 1499, and arrived again in Lisbon after having been absent about two years. He was received with the highest honour and magnificence, and cre ated Admiral of the Indies.

Columbus, in the mean while, who had been disappointed of countenance and assistance from the court of Portugal, having been at length patronised by the court of Spain, had visited the new hemisphere, and returned. He had hoped to reach the Indies by a western route, but was detained by the magnitude of his discoveries on the other side of the Atlantic; having, it is true, supposed at first that the islands he met with, were but the outskirts of the Indian continent, lying to the east of Asia, which he therefore called the *West* Indies.

EARLY ENGLISH VESSEL.

We must now turn our attention again to the state of navigation with the English, while we shall notice at the same time whatever bears relation to it among the nations of Europe, who now engrossed, in great measure, the historical glory of the human race.

France does not appear to have acquired any naval strength until about the twelfth century; for she seldom took part in the Mediterranean battles. About the period to which we now allude, however, France found herself compelled to resist the attacks of the English, who ruled the English channel almost uninterruptedly. A series of wars ensued between the English and French, for a long succession of years, during which there appear to have been great improvements made in the construction of their vessels, for there was now a regular distinction effected between galleys and ships of war.

The fleet in which Richard Cœur-de-Lion went to the Holy Land, was an object of great admiration in those days, from its extent and beauty. His ships, collected from all the ports of England, and the west coast of France, which was entirely subject to him and his mother, formed the finest fleet that had ever been under the command of any king of England. There appear to have been thirteen large ships called *Busses* or *Dromons*, which sailed with a triple spread of sails; about fifty armed galleys: and 100 transports or vessels of burden. Besides these there were 106 vessels, which had assembled at Lisbon, coasted round Spain as far as Marseilles, and thence took a departure for Syria, without touching at any other port. The average number of men sufficient to navigate these, and even those of later times, was forty for the largest vessels, twenty for smaller ones, and ten or fifteen for still smaller ships.

All these vessels rowed, and also sailed. The galleys were adorned with innumerable pennants, waving in the wind; and banners or standards, fixed in graceful order on the tops of the spears. The *Rostra*, or beaks, were distinguished by the variety of their paintings or figures; and the prows of the vessels shone with the light reflected from the shields fixed upon them. In order to keep the fleet from dispersing in the night time, a lantern was carried aloft by the king's vessel, which led the way for the whole fleet.

The accidents which occurred to William, son of Henry the First, and to Henry, son of Henry the Second, sufficiently show that the boats in use at those periods must have been of very large size. The former prince, having embarked on board a new vessel, built by himself, for the purpose of conveying himself and suite, inconsiderately attempted to outsail that of the king; in consequence of which it ran on a reef of rocks near the shore. The boat was immediately hoisted out, and the prince, with some of his attendants, might have escaped, but between two and three hundred persons got into the boat, caused it to upset, and all were drowned. On the other occasion, the king having made an excursion to Brittany, was overtaken by a violent storm on his return, by which a boat, in which were his son Henry and three hundred other persons, was upset. The large number of persons contained in these boats, is indicative of the great dimensions of which they must have been made.

King John, whatever were his defects as regards the internal government of his kingdom, paid great attention to maritime affairs, and the English navy gained great strength during his reign. On one occasion his admirals adopted a singular mode of annoying an enemy:—they fixed a number of pots on the decks of the English vessels, filled with unslaked lime: water being poured into these vessels a short time before the commencement of the engagement, and the English keeping the windward side of the pots, the smoke or steam was driven so forcibly into the faces of the enemy, that the latter were almost deprived of the power of defence. Taking advantage of this state of things, the English plied their arrows and other missiles with such effect, that they gained a complete victory over a very superior fleet.

During the reign of Edward the Third, an engagement took place between the English and French fleets, which is worthy of remark, as a change in the form of vessels was observed at that time. The battle in question was fought off the coast of Flanders; and the English ships engaged in it differed so far from those which have hitherto occupied our attention, that no galleys or beaked vessels were employed: they were, in fact, more nearly what we should call *ships*. On board of these ships, the archers and slingers, supplying the place of the modern musketeers or marines, were stationed near the prow or stern; the centre, or midship, was filled with the various engines then in use, contrived for the purpose of throwing large darts and stones, which were not long after supplanted by the introduction of cannon. The array in which these ships were formed for the battle, was this:—The largest, and consequently the stoutest, vessels were stationed in front; those on each wing or flank were filled with archers, with the exception of every third vessel, which was manned with a crew more numerous than the rest, and with many of that class of soldiers styled "men at arms," for the purpose of working the engines to which we have alluded above. A second line of ships was formed as a *corps de reserve*. Oars began to be very much abandoned at this time; but still they were retained as a resource when the wind failed to fill the sails.

From the evidence of coins, sculpture, &c., it appears that the vessels employed at this time, under the name of *ships*, were much shorter than the ancient galleys, and their sterns and prows were considerably more elevated above the surface of the water than the midship or centre of the vessel, which, from the peculiar shape of the bow and after-part, assumed much the contour of a half-moon. The masts were, generally speaking, single, and seldom, if ever, exceeded two in number. The sails were all square; and the yards, lowering down on the deck, like those of a modern lugger, when the vessel was brought to anchor, rendered the rigging very simple. The frame, which formed the support of the hull, was, in principle, similar to that now constructed, except that those which are called the *filling timbers* were omitted. The outside planks were fastened to the frame by iron nails; and were not set edge to edge, but lapped one over another, with a sufficient caulking between them to keep out the water. In other respects the ships greatly resembled the Mediterranean galleys.

In these ages there existed, for about two centuries, a great commercial and nautical power in the *Hanseatic League*, which was an union of several of the principal maritime cities of Europe, in order to protect each other against the princes of those days, who were mere warriors, and whose chief occupation was robbery and plunder. The League therefore kept fighting-ships, and numbered seventy-two cities in their association. In course of time, as each nation, and England in particular, began to be able to defend itself, this association became extinct.

It may now be interesting to enter into a few details respecting the gradual changes in the form of vessels during the fifteenth century.

The ancient galleys were superseded by what were termed *galleons*, in which the sides were raised higher than those of the galleys, in order partly to allow room for the port-holes of cannon, after that description of arms became prevalent. In order to carry up the sides of the vessels to a greater height, it was necessary to determine whether they should be vertical, or decline outwards, or incline inwards; in general the latter plan was adopted, so that the deck was scarcely half the breadth of the hold, or lower part, and gave to the vessel a clumsy appearance, which may often be seen in representations of vessels of those times.

The galley, the galleon, and the galleas, had certain distinctive characters peculiar to each. The galley bore a strong resemblance to the rude vessels of earlier ages, so far as form was concerned; and when cannon were introduced upon them, they were placed upon deck, and simply fired over the side of the ship, or through small notches cut in the gunwale. The galleasses carried guns on their broadsides between the oars, of which there were three tiers or banks: the galleas was much larger and broader than the galley; and was furnished at the head and stern with cannon, larger and more numerous than those in the galley. These vessels, which were peculiar to Venice, were sometimes above 150 feet long, and more than thirty wide; they had also three masts, and sails of a triangular form. The galleon differed both from the galley and the galleas in the important circumstance of being *without oars*, its propulsion being accomplished entirely by sails: the contraction of the width of the vessel as it approached the deck, was, as we just observed, another point of distinction in them.

The ancient war-galleys, then, were not entirely given up until the commencement of the fifteenth century; for, though some innovations had crept into the use and management of them, the distinctive character of *oars* had not yet been set aside. But now, among the nations which were active in nautical affairs, larger ships began to be used, having sails: they were of a crooked half-moon shape, high

at the stem and stern. The planks were nailed together, and overlapped with iron. The sails were square, and were suspended from two masts. This may be called the sum of ship-building characteristics for this age. The *bowsprit*, or sloping mast at the head of a vessel, was first employed in the reign of Henry the Sixth, when four masts were sometimes used, having a sail to each. Soon after, the largest vessels had a *forecastle*, or place for the foremast, at the head, and a cabin at the stern. The largest ships, that were managed by sails, were called *carricks*; the inferior vessels were *galleys*, *hulks*, *barges*, &c. The first trading vessel of large size was built at Hull, in the year 1449. In 1474, we read of two ships at Bristol, one of 500 tons burden, and the other of 900. Henry the Eighth, we are told, had a ship of 1000 tons burden, called the "Great Harry," which had four masts, with balconies, turrets, and towers; and flags streaming from every elevated part. These vessels did not usually belong to one person; for several parties would engage in a trading adventure; of which parties the government of the country often formed one. Before the practice of marine insurance reduced the hazard of the sea to almost arithmetical certainty, it was more necessary than now for ship-owners to divide their risk by holding shares in several vessels, rather than embarking too much of their capital in one bottom. Accordingly, about the year 1100, when insurance was certainly unknown in England, and perhaps even in the commercial states bordering on the Mediterranean, we find a half-share of one vessel, and a quarter of another, belonging to Godrick, a native of Walpole, in Norfolk. The celebrated Whittington appears to have been a successful mercantile speculator, whose ship, from some circumstances handed down to us, partly truth and partly gossip, was named "*the Cat*." He lived in the reign of Henry the Fourth, at the beginning of the fifteenth century.

The following description has been left of a Scottish ship of war of about this period:—"The king of Scotland rigged a great ship called the Great Michael, which was the largest, and of superior strength to any that had sailed from England or France: for this ship was of so great stature, and took so much timber, that except Falkland, she wasted all the woods in Fife, which were oak wood, with all timber that was gotten out of Norway; for she was so strong, and of so great length and breadth, that all the wrights of Scotland, yea and many strangers, were at her devices by the king's command, who wrought very busily in her; but it was a year and a day ere she was completed. To wit, she was twelve score foot of length, and thirty-six foot within the sides, she was ten foot thick in the wall and boards; on every side so slack and so thick that no cannon could go through her. This great ship cumbered Scotland to get her to sea. From that time that she was afloat, and her masts and sails complete, with anchors offering thereto, she was counted to the king to be thirty thousand pounds expense, by her artillery, which was very great and costly to the king, by all the rest of her orders. To wit, she bare many cannon, six on every side, with three great bassils, two behind in her dock, and one before, with three hundred shot of small artillery, that is to say, myand and battered falcon and quarter falcon, flings, pestilent serpentens, and double dogs, with hagtot and culvering, crossbows and handbows. She had three hundred mariners to sail her: she had six score of gunners to use her artillery, and had a thousand men of war by her captains, shippers, and quarter-masters." We may easily suppose that this was a wonder of the age, and not a very correct type of the generality of the Scotch king's ships.

Until the introduction of the compass and nautical astronomy, ship-building, and the management of vessels generally, advanced not beyond the condition to which we have alluded: but, when men were freed from dependence upon the land by the application of new nautical aids, the increased means which they possessed, led to discovery and further improvement; which, in turn, conduced to the greater perfection and applicability of the aids in question. So that one acted upon the other, in the service of man; and, in due course of time, the other conveniences and necessaries for conducting a voyage over the wide sea, were introduced and employed.

It appears that, in all ages, seamen have been superstitious and credulous to an extraordinary degree. Those who, when danger is near, have the courage of the lion, have at other times much of the simplicity of a child. Among the wonders, which used to be faithfully credited by sailors, was the *Mermaid*, a creature who was said to be half woman and half fish. During the middle ages numerous narratives were made by seamen, of the mermaids whom they encountered in their voyages. In modern times the belief in the existence of these semi-human beings has died away; but the following account will show that not only seamen, but men of literary attainments credited their existence. It is taken from Harris's *Navigantium atque Itinerantium Bibliotheca**, which was published in the early part of the last century.

"As Captain Whitbourn was standing by the water-side, in St. John's harbour, in Newfoundland, one day early in the morning, he spied a creature making very swiftly towards him, which, by the eyes, nose, chin, ears, neck, forehead, and, in a word, by all those upper parts, which were very well proportioned, appeared to be a woman. The hair indeed was to be excepted; for instead of that, there were all round about upon the head as it were blue streaks, which much resembled hair, and hung down to the neck. The captain says, he beheld it intensely, (and so did another of his company, that stood not far from him,) and stayed till it came to about the length of a long pike from him, and then he thought it time to go backwards. When the creature saw that he went from it, it turned about also, and made away, which gave him the opportunity of viewing the shoulders and back parts of it, down to the waist, which he declares were as square, smooth, and white, as the like parts in mankind. From the middle to the lower part (to use his own words) it went pointing, in proportion like a broad-hooked arrow: but how it was in the fore-part of the body, from the neck and shoulders downwards, he could not discern, because it did not advance towards him so much above the water as it went away. This siren had a mind for the captain's company in some palace or other within the dominions of Neptune; but he (though otherwise a man of good breeding) refused the favour and slighted her. What she would have done with him there, the Lord knows; however, he knew there was no good wine in that country, but on the other hand, a most confounded guzzling of salt water, such as would no way agree with his constitution. So he retired from her, and thereby, perhaps, escaped a drinking bout, which would have cost him his life, and deprived him of Christian burial too. The siren let him go, and did not attempt, by any further discovery of her charms, to seduce him. She had shown him those of her face, but thought him unworthy of the charms of her voice; those which poets through all antiquity have so wonderfully extolled. However, the same creature came shortly after to the side of a boat, in which were some of the captain's men, and endeavoured to come in to them. These fellows were sufficiently scared at the sight of it, but ready to leap out of the boat when they saw it attempting to get in; yet one of them recovered so much spirit, as to manage his oar, with which he struck the siren a sound blow across the head, that made her let go her hold, and drop into the water. But that it did not kill her was plain, by her coming afterwards to some boats in the harbour; at which time, the boats being near the shore, the men got all out and ran for their lives. This appeared to be the very same with the former, and the same it was, unless she died from that blow upon the head, and waked afterwards. Upon the whole we can't see why this relation should not as effectually persuade all people that there are such creatures, as the voyage itself should that there is such a place as Newfoundland; for a man used to converse with the dangers and monsters of the sea, one may very easily believe not to be timorous. And a man can have no interest in forming a story of a mermaid, which is not at all adapted to serve any design in church or state. If the reader won't be convinced by this, there is no way for him, but to follow the captain to St. John's harbour, and there wait for ocular demonstration."

Thus wrote Mr. Harris, who was the editor of the first English Encyclopædia. We doubt, however, whether any of our modern readers would like to follow his advice, by taking a voyage to Newfoundland, and there wait till they obtained "ocular demonstration" of the existence of mermaids! It is difficult at the present day, to conjecture what these mermaids really were; but we shall probably be safe in affirming that superstition and imagination had a large share in their creation.

We may perhaps consider unicorns and mermaids to be about equally deserving of credit. Many ancient travellers brought home marvellous accounts of the unicorn. Purchas, who wrote his "Pilgrimage" between two and three hundred years ago, has this remark:—"In Bengala are

* *Historical Repository of Sailors and Travellers.*

found great numbers of Abadas or Rhinocerotes, whose horne (growing up from his snout,) teeth, flesh, bloud, clawes, and whatsoever he hath without and within his body, is good against poyson, and is much accounted of through all India. The skin vpon the upper part of this beast is all wrinckled, as if he were armed with shields. It is a great enemie of the elephant. Some thinke that this is the right Vnicorne, because as yet there is no other by late trauellers found, but only by heare-say. Lodouicus Vertomannus saith he saw a couple of those other Vnicornes, at Mecca: one whereof had a horne of three cubits, being of the bignesse of a colt of two yeeres and a halfe old: the other was much lesse: both sent to the sultan of Mecca, for a rare present out of Ethiopia. Gesner, in his booke of foure-footed beasts, citeth this testimony, and some others, whereby he perswadeth that there are divers sortes of these Vnicornes: but it cannot seem otherwise than strange, that in this last hundred of yeeres, wherein the world hath vn-veiyled her face more than euer before; none of credit (that I haue heard) hath affirmed himselfe to haue seene this Vnicorne, but in picture."

The passage round the Cape of Good Hope having been effected, other nations, such as the Dutch, the English, and the French, were not slow in following in the same track; among whom the English in due course of time signalised themselves; which led to the foundation of the East India Company in the reign of Queen Elizabeth. The establishment of this company promoted the growth of commerce, and fostered a spirit of discovery; by both of which the human race has been remarkably benefited.

As we shall soon have to speak of those voyages to the West, by which the whole habitable globe was laid open to the industry and curiosity of man, it will be proper in this place to preface the western discoveries by noticing the various traditions, which were popularly believed in Europe, respecting what was, or was supposed to be, in or beyond the vast waters of the Atlantic.

It was said that, at a time indefinitely remote, there existed a vast insular territory, extending beyond the coasts of Europe and Africa; and that this land was called *Atlantis*. In the fourteenth century, maps were drawn representing this strange country, which having been shaken for three days to its foundation by an incessant earthquake, at length yielded to the irresistible and mysterious power of the Deity, and sank with its inhabitants into the depths of the ocean. It was given out that the inhabitants of Madeira, and the other western isles, saw, at certain times, and in very clear weather, land appearing in their western horizon, and always in the same direction. It is said that the islanders are sometimes persuaded of this at the present day; and that, in the middle of the last century, this visionary land was seen so distinctly, that a vessel actually sailed out to discover it; but it faded away before the navigators, as in former cases when they sought to get near it. This land was called *St. Brandon's* land; he being a Scottish saint had in repute among the Northmen, who first sailed into these parts, in the sixth century, and who first roused a belief in the existence of western lands; which belief they themselves first entertained.

In like manner also, the people of the islands of Arran, at the mouth of the Galway bay, off the west coast of Ireland, who are descended from the Northmen, fancy they see from time to time, the shores of a happy country, rising above the waves; with which country they say Ireland was formerly united, until, owing to the sins and offences of its inhabitants, the greater part of it was swallowed up in the ocean. This, with the preceding fancied appearances, was doubtless the result of some optical delusion. But, in a map published by Martin Behim, about the time when Columbus set out on his expedition, we find the island of *Antilla*, or the *Seven Cities*, lying out a little more westward than the Azores. These cities were said to have been built and occupied by the Christians who fled from Spain when that country was conquered by the Moors. These imaginary cities the Spaniards endeavoured to find, soon after their discovery of America. Northward of these cities the maps of the times placed the *Island of the Devil's Hand*; which seems to have been so called chiefly in accordance with an Arabian tale, which relates, that in the Indian sea there is an island, near which a great hand rises every night from the water, and, grasping the inhabitants, plunges them into the ocean. This story, being joined with the common notion, that the dead reposed in the far-off west, gave rise to the appellation stated above. Still further on, but nearer the equator, is *St. Brandon's Island;* and still further on, are placed many of the countries visited by Marco Paulo, the Venetian traveller; which countries are named as abounding in every thing rich and beautiful. The seas are peopled with sirens. Beyond these countries, but on the other side of the equator, are ten small islands, where ships cannot sail, owing to the loadstone, which abounds in the rocks, attracting the nails and iron-work out of the ships, and so causing them to fall to pieces.

We have already observed, that the traditions just related might probably have had a certain effect upon the mind of Columbus, to stir him up to solve the problems and difficulties which had long been started on this point. But this could not have been sufficient to decide the calm and reasoning mind of Columbus, that land might be found on the opposite hemisphere of the world; or rather, that by sailing on westward, the East Indies must necessarily be arrived at. A due consideration of the spherical figure of the earth, with the fullest knowledge of astronomy, geography, and navigation, which the times afforded, were the main aids, which incited this distinguished navigator to institute, and to carry to a successful termination, the task of examining the more distant portions of the globe. Not but that such information might have occasionally reached Columbus, as was likely to influence his judgment in a subordinate degree. It appears that the inhabitants of some of the islands west of Africa had picked up every now and then pieces of artificially carved wood, which could not have been cut with a knife, and which must have been brought thither by strong westerly winds. Other persons, navigating in those seas, had taken up canes of an extraordinary size, described by Ptolemy as peculiar to India, trunks of large pine-trees, which had been torn up by the roots, and plants such as had not been seen in the Old World. Some bodies of men were once found upon the shore of Flores, one of the Azores, having been cast there by the waves. These bodies had features and complexions differing essentially from those of the inhabitants of Africa, or of Europe, or from anything hitherto seen; and were in consequence always adjudged to have been wafted over from the West.

After much toil and vexation of body and mind, endured first at the court of Portugal, which, having deluded him, he was obliged to forsake, and afterwards at the court of Spain, as we before remarked, this latter power at length sent Columbus out on a voyage of discovery towards the West, in the year 1492. The expedition consisted of three vessels, having on board about one hundred men; and at setting out Columbus appears to have proposed to himself the exceeding probability of reaching the kingdoms of Cathay and Zipangu, which formed, according to the cosmography of the day, part of the great continent of India, on the Asiatic coast, and were distant about one-third of the circumference of the earth, as he supposed. He thus set out under the influence of two favourable errors; thinking, first, that Asia extended so much more to the East than it really does, and, secondly, that the Earth was much smaller than it has since been proved to be. The empire of Cathay, mentioned above, appears to have been *China*, which had been long described as being extensive, opulent, and populous The inhabitants, we are told, had a very exalted notion of themselves, which they evinced by saying that they alone, of all people in the world, *had two eyes*. The Latins, say they, *have one*; but all other nations are blind.

Columbus arrived first at the island of San Salvador; after which he visited several of the West India islands, and settled a colony in Hispaniola. He then again set sail for Spain, and reached the port of Palos on the 15th of March, 1493. He was ill-treated, and ultimately neglected by the court of Spain, which he had faithfully served. He died in 1506.

In our next paper we shall enter upon the subject of Modern Navigation.

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